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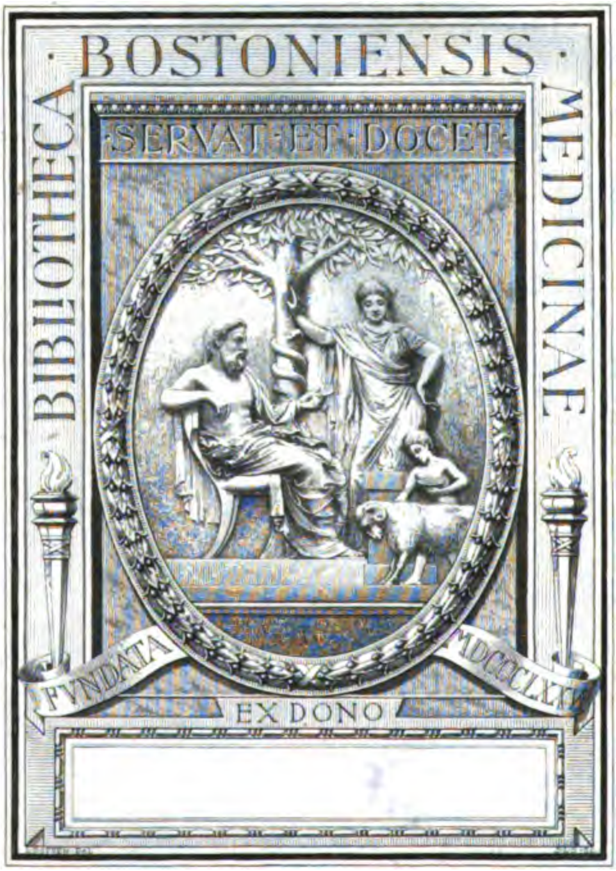

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ANSWERS

TO

QUESTIONS PRESCRIBED

BY

PHARMACEUTICAL STATE BOARDS.

BY
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PREFACE.

The indorsement of the answers and questions prescribed by Medical and Dental State Boards, as shown by numerous expressions of approval by the profession and students at large, has induced me to prepare this book.

Many persons having an adequate knowledge of the subject in which they are tested fail because of their inability to interpret properly the intents and purposes of the questions to be answered by them. To aid in this, as well as to afford a convenient manual for the general preparation of pharmaceutical students in their work, is the sole object of this book.

Having collected a large number of questions from different States, it was found that duplications occurred, ranging from 40 per cent. to 85 per cent., varying according to the several subjects. Thus a comprehensive knowledge of these questions and answers will serve excellently in the preparation for future examinations before such Boards.

In order to secure a critical interpretation of the questions and concise, yet complete, answers to the same, the author has been favored by the assistance of well-known specialists in their several lines, whose competence and experience give to the work a range and value impossible of attainment in the product of a single author.

The contributors have acquired merited distinction as practitioners and teachers of their specialties. The author desires to express his thanks for their support and co-operation and his appreciation of their work.

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PHARMACY.

What is Pharmacy?

Pharmacy is the science which treats of medicinal substances.

What methods of making tinctures are recognized by the U. S. P.?

Percolation, maceration and solution (or dilution).

Briefly describe each method.

In percolation the powdered drug is placed in a suitable container and its soluble contents extracted by running a liquid through it and collecting the liquid.

Maceration is that process by which the ground drug is allowed to stand in the menstruum, and finally the liquid is expressed.

Solution is the process of dissolving the medicinal substance in the liquid.

How would you crystallize a salt?

Dissolve it in the least amount of distilled water, apply heat to evaporate a little water, then set aside. On cooling, the salt will crystallize.

How do resins differ from gums?

Resins are insoluble in water; soluble in alcohol. Gums are insoluble in alcohol; soluble in water.

From what is common resin (or rosin) made?

Turpentine, after distilling its volatile oil.

What is destructive distillation?

The process of heating dry organic matter in a distillatory apparatus until all volatile substances are driven off.

What is sterilization?

The process of killing germs and their spores by heat.

Why are tinctures not made of a uniform strength?

Because of the wide variation in potency. The dose of some would be too large.

Name five (5) tinctures and give the percentage strength of each.

Tincture of aconite, 10%; tincture of belladonna, 10%; tincture of opium, 10%; tincture of iodine, 7%; tincture of digitalis, 10%.

What is fermentation?

The phenomena due to subjecting organic bodies to the action of warmth, air and water with the production of useful substances.

How much alcohol should be added to five (5) gallons of a liquid to make the product 20 per cent alcohol strength?

Alcohol, 1¼ gallons.

How many grains in an avoirdupois, a troy, and a fluid ounce?

Avoirdupois, 437.5. Troy, 480. Fluid ounce depends on what liquid, *e. g.*, water is 454.6 + grains, at 25° C. (77° F.).

How do blue mass and blue ointment differ?

Blue mass is for internal use, and contains mercury, licorice, althea, glycerin, and honey of rose.

Blue ointment is for external use, and contains mercury, oleate of mercury, benzoinated lard, and suet.

What are elixirs?

Elixirs are aromatic, sweetened, alcoholic preparations containing a small amount of active ingredient.

How could you make a solid extract from a fluid extract?

By evaporation on a water-bath.

How do you estimate the strength of a solid extract?

By assay, to determine the amount of active ingredient.

What causes precipitates to form in tinctures and fluid extracts?

The evaporation of alcohol and the action of light on the "extractive matter," and other constituents.

What is the opium strength of paregoric? Of laudanum?

Paregoric, four-tenths per cent; laudanum, ten per cent.

What weights and measures are used by physicians in writing prescriptions?

Apothecaries weight and metric weight. Liquid and metric measure.

Give exact outline or table of each.

Apothecaries.

20 grains = 1 scruple.
3 scruples = 1 drachm.
8 drachms = 1 ounce.
12 ounces = 1 pound.

Liquid.

60 minims = 1 fluidrachm.
8 fluidrachms = 1 fluidounce.
16 fluidounces = 1 pint.
2 pints = 1 quart.
4 quarts = 1 gallon.

METRIC.

Solid.

10 milligrams = 1 centigram.
10 centigrams = 1 decigram.
10 decigrams = 1 gram.
10 grams = 1 dekagram.
10 dekagrams = 1 hectogram.
10 hectograms = 1 kilogram.
10 kilograms = 1 myriagram.

Liquid.

10 milliliters = 1 centiliter.
10 centiliters = 1 deciliter.
10 deciliters = 1 liter.
1000 liters = 1 kiloliter.

What designates the dissipation of liquids by the application of heat?

Evaporation.

Of solids?

Sublimation.

The formula for compound licorice powder is: Senna 180 grams; liquorice, 236 grams; washed sulphur, 80 grams; oil of fennel, 4 grams; sugar, 500 grams. Write a formula for 5 lbs. avoirdupois of the powder.

Senna	14 oz.	182 grains.
Liquorice	18 oz.	400 grains.
Washed sulphur	6 oz.	182 grains.
Oil of fennel		146 grains.
Sugar	40 oz.	

The formula for tincture cinchona compound is: Red cinchona, 100 grams; bitter orange peel, 80 grams; serpentaria, 20 grams; glycerin 75 C.c.; alcohol, water, each sufficient to make 1000 C.c. Write a formula for 8 pints of the tincture.

Red cinchona	12 oz.	364 grains.
Bitter orange peel	10 oz.	114 grains.
Serpentaria	2 oz.	255 grains.
Glycerin	9 fluid oz.	ʒv.
Alcohol Water	of each sufficient to make 8 pints.	

Give two (2) examples each of deliquescent and efflorescent salts.

Deliquescent	Potassium carbonate. Calcium chloride.
Efflorescent	Sodium carbonate. Ammonium carbonate.

Write a formula for a troy ounce oleate of morphine, 6 per cent, and tell how you would make it.

℞.	Morphinæ	gr. xxix
	Acidi oleici	q. s. f℥i.

Triturate the morphine in a warm mortar with a little oleic acid to a smooth paste. Then add the remainder of the oleic acid; warm and triturate until the morphine is dissolved.

Write a formula for 4 pints of a solution of carbolic acid, 3 per cent.

℞.	Phenolis	℥iʒvjss
	Aquæ dest. q. s.	Ojv.

Write a formula for 25 pills each to contain the following: Strychnia, 1 milligram; reduced iron, 60 milligrams; quinine sulphate, 100 milligrams.

℞. Strychninæ		025
Ferri. reducti	1	500
Quin. sulphatis	2	500

M. ft. Pilulæ No. xxv.

How would you powder gum camphor?

Add a few drops of alcohol and pound in a mortar.

What is an impalpable powder?

One of extreme fineness.

What is the common name for liquor ammonii acetatis? How is it made?

Spirit of mindererus. It is made by saturating diluted acetic acid with ammonium carbonate.

What is rock candy syrup, and what contamination does it often have?

An aqueous solution of sugar. It is often adulterated with glucose.

What are liquors of the U. S. P.?

Aqueous solutions of non-volatile substances.

What is the strength of pepsin U. S. P.?

1 to 3000.

How are effervescing salts prepared?

The salt is granulated and dried, then mixed with citric or tartaric acid, and then with sodium bicarbonate, placed in a warm oven until slightly moist and rubbed through a No. 6 tin sieve.

How are the U. S. P. resins prepared?

An alcoholic extract of the drug is washed repeatedly with water and the product dried.

How are fixed oils prepared? How are volatile oils prepared?

Fixed oils are expressed.

Volatile oils are obtained by either distillation or solution. A few by special methods.

What is meant by a synonym?

A word used in place of another. Applied to common names for official drugs.

What is meant by solution?

Solution is the mechanical separation and diffusion of the molecules of a substance, either solid, liquid or gaseous, through a liquid.

What is a saturated solution?

A solution containing its maximum of the solid in solution.

Name five (5) solvents used in Pharmacy.

Alcohol, water, ether, acetic acid, and chloroform.

How would you test the accuracy of a 1 ounce graduate?

Weigh into the graduate 454.6 grains of distilled water at 25° C. and note the capacity. This figure is the weight of 1 fluid ounce.

What is the difference between carbonate of magnesia and calcined magnesia?

Magnesium carbonate is deprived of its carbon-dioxide and water to form the calcined, which is an oxide of magnesia.

Name three (3) tinctures made by solution.

Tincture of iodine, benzoin and iron.

Name three (3) tinctures made by percolation.

Tincture of belladonna, aconite and cardamom compound.

Name three (3) tinctures made by maceration.

Tincture of musk, myrrh and squill.

Give the source of the following acids:

Gallic = nut galls.
Tannic = nut galls.
Benzoic = benzoin.
Lactic = milk.
Malic = apples and fruits.

How many grains of morphine in 2 1-2 ounces Magendies' solution?

40 grains.

Give the difference in grains between the avoirdupois and the Troy pound.

1240 grains.

How many grains of opium are contained in 3 1-2 grains of Dover's powder?

About 1/8 grain.

What is the difference between spirits of ammonia and aqua ammonia?

The spirit is an alcoholic solution of ammonia gas while the aqua is watery.

What is meant by an amorphous salt?

Non-crystallizable.

Give two (2) examples of amorphous salts.

Ferric citrate and magnesium oxide.

What is meant by an official preparation?

One recognized by the U. S. Pharmacopœia.

Name the three (3) different processes for making official tinctures.

Percolation, solution and maceration.

How many grammes in five (5) ounces avoirdupois weight?

141.75.

What is the difference between a decoction and an infusion?

A decoction is made by boiling the drug with water, while the infusion is made by pouring boiling water on the drug and allowing it to cool.

Name two (2) official infusions.

Infusum digitalis, infusum sennae compositum.

How many cubic centimeters in one pint imperial measure?

567.

Give the U. S. P. formula for carron oil.

Lime water, 500 C.c.; linseed oil, 500 C.c.

How much opium should there be in 25 cubic centimeters of vinum opii?

2½ grammes.

How much opium should there be in 25 cubic centimeters of paregoric?

1 decigramme.

What is meant by spontaneous evaporation?

Dissipation of a liquid at ordinary temperature.

Give the approximate measure in fluid drachms of a

Wineglassful = 16
Tablespoonful = 4
Dessertspoonful = 2
Teaspoonful = 1

Give the official name of Chalybeate pills.

Pilulae ferri carbonatis.

What causes the milky appearance in liquor plumbi subacet. dil.?

The presence of carbon-dioxide in the water forms lead carbonate.

What pills of U. S. P. are directed to be coated with balsam tolu?

Pills of phosphorus and ferrous iodide.

Why is glycerin sometimes used with the menstruum in making tinctures?

To increase the coloring power of the menstruums and aid in preservation, especially where tannic acid is present.

If not specified, what weight would you make rectal suppositories?

30 grains.

Write the following prescription in metric measure:

℞.	Tincture aconite	mxxxjj
	Tincture cinchonæ co. ·	ʒ jjj
	Elix. potass. brom.....	ʒ jv
	Elix. simplex. ·q. s. ad.	℥ jj.
	M. Sig.	

	Metric.	
℞.	Tinct. aconiti.........	2 00
	Tinct. cinchon. co.....	10 00
	Elix. pot. brom.......	15 00
	Elix. simp.	60 00
	M. Sig.	

What percentage of crystallized morphine should pulvis opii U. S. P. contain?

12 to 12.5 per cent.

How would you make Hoffman's anodyne?

Simple mixture of ether, alcohol and ethereal oil.

Explain the process of levigation, and of pulverization by intervention.

Levigation is the process of reducing substances to fine powder by rubbing on a slab the powder previously moistened.

Pulverization by intervention is the process of powdering solids by the addition of volatile substances to aid in reducing.

Interpret the following:

Omni hora = every hour.
Bis in die. = twice daily.
Pro re nata = as much as required.

What is a fixed oil? An essential oil?

A fixed oil is non-volatile. An essential oil is volatile.

Give one example each of a fixed oil and an essential oil.

Fixed = castor oil.
Essential = cinnamon oil.

Name the infusions of the pharmacopoeia.

Infusion of digitalis, wild cherry, compound senna.

Which of the above infusions are directed to be made with boiling water?

Digitalis and compound senna.

Why are the other infusions directed to be made with cold water?

To save the active ingredient, which is volatile with heat.

What is elutriation?

The process of obtaining a substance in fine powder by suspending it in water, allowing the heavier particles to subside, decanting the supernatant liquid and collecting the residue.

What are misturae?

They are aqueous liquids for internal use containing insoluble substances in suspension.

Name two (2) official misturae.

Mistura glycyrrhizae composita, mistura cretae.

Explain the difference between tinctures and spirits.

Spirits are alcoholic solutions of volatile substances, while tinctures are not altogether alcoholic, containing in some cases also water and glycerin; nor are the medicinal ingredients always volatile.

How many grammes in three (3) ounces?

90 grammes.

Name four (4) official glycerites.

Glyceritum amyli, boroglycerini, hydrastis, phenolis.

What official ointment is made by chemical reaction?

Unguentum hydrargyri nitratis.

How is tinctura ipecacuanhae et opii made?

Evaporate 1000 c.c. deodorize tincture of opium to 800 gm., and when cold add fluid extract of ipecac; filter, and pass enough diluted alcohol through the filter to make 1000 c.c.

What are triturations?

They are 10 per cent dilutions of medicinal substances in sugar of milk.

Name one (1) official trituration.

Trituratio elaterini.

How many ounces in 53 cubic centimeters?

$1^{23}/_{30}$ ounces.

What is ebullition?

The process of boiling.

Write translations of the following abbreviations:

ss = one-half.
aa = of each.
ad = to.
q. s. = sufficient quantity.
m. = mix.
ft. = make.
sig. = write.

Why are prescriptions usually written in Latin?

It is more scientific, often keeps the patient in ignorance of the medicines, and, being unchanging, is not affected by idioms. The Latin is more distinctive.

How is massa hydrargyri made?

Mercury is triturated with honey of rose until invisible with a 10-power microscope. Add glycerin, licorice and althaea, and triturate until homogeneous.

Give the method of making an official medicinal water from a volatile oil.

Triturate the oil with talc, and gradually add the water and filter.

Give the common name of mistura ferri composita, and state whether it is a stable preparation.

Griffith's Mixture. It is not stable.

Why is purified talc used in making syrupus scillae compositus?

To aid in filtration of the mixed fluidextracts.

What is the percentage strength of the official solutions of arsenic?

One per cent.

Give the common names of the official solutions of arsenic.

Solution of arsenous acid (solution of chloride of arsenic), Fowler's solution, Donovan's solution, solution of sodium arsenate (Pearson's solution).

Name an official liquor that contains a corrosive substance.

Liquor hydrargyri nitratis.

Name an official liniment that contains camphor.

Linimentum saponis.

How would you make oleate of mercury? Give its percentage strength in the U. S. P.

Triturate yellow oxide of mercury with water, add the oleic acid, and warm until water is evaporated under trituration. 25 per cent.

What U. S. P. tincture is made from a solid assayed extract and of what percentage strength should it be?

Tincture of nux vomica. The extract should contain 5 per cent strychnine.

What official tincture is made by first washing the drug in benzin—and why is benzin used?

Tincture of lactucarium. Benzin is used to remove the fixed oil which is present in the drug.

Give the formula for 16 ounces of 1 in 1750 solution of hydrargyri bichloride.

℞. Hydrarg. bichloridi .... gr. iv
Aquæ dest......................q. s. ad. Oj.
M. ft. sol.

What is Basham's Mixture? Is it permanent? If not, give the reason.

Basham's Mixture is liquor ferri et ammonii acetatis. It is not permanent, because ferrous hydrate is liable to form, due to decomposition.

How would you make 1 ounce of a 7 per cent solution of eserine?

Dissolve 32 grains of eserine in water.

In making percentage solutions should the solvent be taken by weight or measure? Give an example.

By measure. A 5 per cent aqueous solution of phenol would contain much less than a glycerin solution if taken by weight, but the same amount if taken by measure.

Write the following prescription in the metric system.

℞.	Quininæ sulph.	gr. xxiv	℞.	Quin. sulph.........	1	50
	Acid sulph. arom. ..	ʒj		Ac. sulph. aromat....	4	00
	Syr. aurantii	ʒvj		Syr. aurantii	22	50
	Aqua...........ad.	℥jv.		Aquæ............ad.	120	
	Misce.			Misce.		

What is the difference between heavy and light magnesia?

A physical difference only. The light magnesia is made from light carbonate; the heavy from heavy carbonate.

What is an emulsion? State proportions of their principal ingredients.

An emulsion is an aqueous liquid containing oily substances in suspension by the use of gums or yolk of egg.

Oil 50% 4 parts.
Gum 12½% 1 part.
Water 25% 2 parts. This forms emulsion base; then enough water is added to make 100% of finished product.

Name the gaseous solutions official in the U. S. P.

Aqua ammoniae, aqua ammoniae fortior, spiritus ammoniae, aqua hydrogenii dioxidi, liquor formaldehydi, liquor chlori compositus.

Give two tests to distinguish creosote from carbolic acid.

Mixing equal parts creosote and collodion produces no permanent coagulum, and on distilling, most of it comes off between 200° and 220° C., which on cooling to 20° C. becomes gelatinous, but not solid.

How do glucosides differ from alkaloids?

Glucosides are neutral. Alkaloids are alkaline. Glucosides yield on fermentation or boiling with dilute acids, glucose and other substances, while alkaloids do not. Alkaloids are insoluble in water, but their salts are soluble. Alkaloids are soluble in ether, alcohol and benzin. Glucosides may be the active principles of the plants, but alkaloids always are.

What syrup contains aqua ammoniae in U. S. P.?

Syrup of senega, as official in the U. S. P., 1890.

What per cent of the alkaloid should extract nux vomica contain?

Five per cent.

Why is boiling necessary in preparing Fowler's solution?

Boiling causes reaction between the arsenic trioxide and the acid carbonate of potassium, forming potassium arsenite.

Give official name for Goulard's Extract.

Liquor plumbi subacetatis.

How is it prepared?

By boiling lead oxide in a solution of lead acetate for half an hour, and filtering when cool.

What is the difference in grains between the avoirdupois and the apothecaries' ounce?

42½ grains.

What is the difference between the U. S. pint and the Imperial pint?

The U. S. pint has 16 ounces; the Imperial has 20 ounces.

What are confections?

Soft, saccharine solids containing medicinal substances in an agreeable form.

Name the official confections.

Rose and senna.

What is adeps benzoinatus?

A mixture of lard and that amount of gum benzoin dissolved by it when hot.

How is it prepared?

Mix the benzoin thoroughly with the lard and digest for several hours, then strain through muslin.

Convert 50° F. to the corresponding degree of Centigrade thermometer.

50° From F.° subtract 32, then divide result
32 by 1.8 = C.°

1.8)18.0(10
18.

.0 Answer, 10° C.

Name five (5) organic and five (5) inorganic acids.

Organic: Tartaric, citric, malic, benzoic, oxalic.

Inorganic: Hydrochloric, phosphoric, nitric, sulphuric, sulphurous.

What are suppositories?

Solid bodies for insertion into the rectum, vagina or urethra for medicinal action, melting at body heat.

What is the base of them as directed by the U. S. P.?

Oil of theobroma or glycerinated gelatin.

What is their weight U. S. P.?

30 grains.

What are oleoresins? Mention two that deposit on standing and how should they be dispensed?

Oleoresins are liquid preparations extracted from vegetable drugs by percolation with acetone, which dissolves the natural oils and resins. Both oleoresin of aspidium and cubeb deposit on standing—the former should be shaken, but oleoresin of cubeb should be decanted.

What menstruum is used in preparing them?

Acetone, in all but oleoresin of cubeb, which is made with alcohol.

In what do they differ from fluidextracts?

Fluidextracts are of a definite strength, while oleoresins are indefinite.

Name three (3) official oleoresins.

Aspidium, ginger and cubeb.

How is ferrum reductum prepared?

By passing hydrogen over ferrous carbonate.

Give formula for Ung. potassium iodide.

Potassium iodide, 10; potassium carbonate, 0.6; water, 10; benzoinated lard, 80.

What is the color of it?

White.

What is contained in same to prevent change of color?

Potassium carbonate.

From what is glycerin obtained?

Animal fats.

Give two (2) tests for its purity.

Boil, and finally ignite the sample on platinum foil. It should completely vaporize and disappear, showing absence of mineral impurities. No cloudiness on addition of barium chloride shows absence of sulphuric acid.

How many grains of cocaine are required to make 100 grammes of a 2 per cent solution?

30.864 (31 grains).

Name three (3) official preparations containing ammonia gas,—state per cent of each, and state to which class of galenical preparations they belong.

Aqua ammoniae = 10%; aqua ammoniae fortior = 28%; spiritus ammoniae = 10%.

They are simple solutions.

What difference in behavior is noticed in case of tincture of iodine and Lugol's Solution upon the addition of water; give reasons for difference?

With tincture of iodine, water evolves heat and throws down a precipitate. With Lugol's Solution water mixes without change, because the tincture is made with alcohol and the iodine is nearly insoluble in water, while the Lugol's Solution is made with iodine and potassium iodide, which increases its solublity in water.

What per cent of morphine must powdered opium contain?

12% to 12½%.

How are sulphur lotum and sulphur praecipitatum prepared?

Sulphur lotum is made by adding ammonia water to sublimed sulphur and digesting three days. Then wash out the ammonia and dry.

Sulphur praecipitatum is made by boiling a mixture of slaked lime and sublimed sulphur for one hour, frequently stirring, decant and filter the supernatant liquid and add hydrochloric acid. Collect the precipitate, wash and dry.

Which is used in making sulphur ointment? What per cent of sulphur does the ointment contain?

Sulphur lotum. Strength, 15 per cent.

How much glycerin in suppositoria glycerini?

90 per cent.

Give chemical name of the substance holding the glycerin.

Sodium stearate.

How much mercury in massa hydrargyri?

33 per cent.

How is it extinguished?

By trituration with honey of rose.

Upon what two (2) substances does the therapeutic value of syrupus pruni virginianae depend?

Hydrocyanic acid and oil of bitter almond.

What takes place during the maceration of the above?

In the presence of water, hydrocyanic acid is formed.

How does alumen exsiccatum differ from alum?

Alum is crystalline, but alumen exsiccatum is a powder deprived of water of crystallization by the addition of heat.

How much can you obtain from twenty pounds of alum?

10 lbs.

What is the difference between a ferrous and a ferric salt?

The iron of the ferrous salt has a valence of 2, while the ferric has 3 (two atoms with a valence of 6).

Which of the two is contained in tinctura ferri chloridi?

Ferric salt.

In massa ferri carbonatis?

Ferrous.

How is pix liquida obtained?

By the destructive distillation of pine wood.

Name the official preparations of it.

Syrupus picis liquidae, unguentum picis liquidae.

Translate the following prescription:

R.	Extracti leptandræ	Semigranum.
	Massæ hydrargyri.	
	Extracti hyoscyami, singularum, grana duo;	
	Extracti colocynthidis compositi, ad. grana decem.	
	Fiant pilulæ duæ	Pro re nata sumantur.
	Nocte	Mitte duodecim.

℞.	Extract of leptandra	½ grain.
	Mass of mercury.	
	Extract of hyoscyamus	of each 2 grains.
	Compound extract of colocynth	up to 10 grains.
	Make 2 pills.	

Let them be taken at night as often as needed. Send twelve.

Criticize the following prescriptions:

No. 1.	℞.	Collodion	Six fluid ounces.
		Tincture iodine	Six fluid ounces.
		Aqua ammonia	Six fluid ounces.

Mix. Sig. Apply as directed.

The tincture of iodine would be discolored by the ammonia and rendered useless for external application, and the aqueous solution of ammonia would not mix with the collodion without precipitation. The iodine would probably react with the ether and alcohol of the collodion, producing heat.

Could not be dispensed as written.

No. 2. ℞.	Magnesium sulph.	Two and a half ounces.
	Spts. menth. pip.	One and a half fluid ounces.
	Aqua	Three fluid ounces.

Mix. Sig. One tablespoonful every 2 hours.

Magnesium sulphate is soluble in that amount of water but would be precipitated by the alcohol of the spts. menth. pip., making an undesirable preparation. More water should be added and dose proportionately increased.

Do solids ever become crystallized without becoming liquefied?

Yes.

What are substances called that crystallize in two forms?

Dimorphous.

In three (3) forms?

Trimorphous.

In more than three (3) forms?

Polymorphous.

How should a powder be packed in a percolator so as to insure its being packed uniformly?

It should be packed in layers, each layer with the same pressure.

How much water must be added to a pint of a solution containing 37.8 per cent of a salt, to make a solution containing 10 per cent of the salt?

$2\ {}^{78}/_{100}$ pints.

In making one (1) kilo. of a mixture composed of oil of sassafras 10 parts, oil of cloves 1 part, oil of cinnamon 1 part, alcohol 3000 parts and water 1988 parts, how many grammes of each would it require?

Oil sassafras	2	
Oil cloves		2
Oil cinnamon		2
Alcohol	600	
Water	397	6

Liquor plumbi subacetatis dilutus—give common name.

Lead water.

Explain why boiled distilled water is directed.

Boiling removes any carbonic acid, which would form the insoluble carbonate of lead, and cause the formation of a cloudy solution.

Liquor acidi arsenosi—state strength.

One per cent.

What substance aids in solution?

Diluted hydrochloric acid.

Describe the principle of weight and measure accepted by the U. S. P.

It is called the metric system, and has for its unit the meter, or the $\frac{1}{40000000}$ part of the earth's circumference at the poles. The liter is the unit of capacity, being the cube of $\frac{1}{10}$ meter, while the unit of weight is the weight of that quantity of water at 4° C. which fills the cube of $\frac{1}{100}$ meter. Each fraction or multiple is obtained by the use of decimals.

What salt of iron does tincture of iron contain?

The chloride.

What is the objection to using fine powders in making infusions?

Because of the difficulty of separating the finer particles to make a clean infusion; also the greater time consumed.

Which is lime more soluble in, syrup or water?

Syrup.

Why?

Because the sugar of the syrup forms a soluble compound with the lime (saccharate of lime).

Why do extracts vary in strength?

Because of the different potencies of the drugs used.

What objection is there to using a minim measure?

Loss of substance in pouring out of the measure.

What would you suggest to use in place of it?

A graduated minim pipette.

What effect is produced by stirring an evaporating liquid?

It hastens evaporation.

Differentiate between higher and lower forms of salts of iron and mercury. Give an example.

The lower salts of iron have a valence of 2, as $FeCo_3$ = ferrous carbonate, while the higher, or "ic" salts, have valence of 3, as $FeCl_3$ = ferric chloride.

The "ic" salts of mercury have a valence of 2, *e. g.*, $HgCl_2$ = mercuric chloride.

The lower salts have a valence of 1, as $HgCl$ = mercurous chloride.

Give an outline of the official process for making pills of phosphorus. How much phosphorus should each pill contain? Why are these pills coated? With what are they coated?

Dissolve the phosphorus in chloroform in a test-tube with a gentle heat. Then mix althea and acacia in a mortar, to which add the solution of phosphorus, and immediately a sufficient quantity of a mixture of glycerin and water to form a pill mass. Dissolve balsam of tolu in ether and shake the pills in this solution until coated. Then dry.

Each pill contains $^1/_{100}$ grain.

They are coated to prevent oxidation of the phosphorus.

The coating is balsam of tolu.

Give general outline of the process for the preparation of a granular effervescent salt? Name two official ones.

Powder the citric acid and mix intimately with the medicinal ingredient and tartaric acid. Then incorporate the sodium bicarbonate. Place the mixed powders on a dish in an oven and heat moderately (200° F.). When the mixture is moist, rub through a sieve and dry the granules. Keep in a well-stoppered bottle.

Caffeina citrata effervescens, sodii phosphas effervescens.

Why is nitric acid used in manufacturing liquor ferri chloridi U. S. P.? Does the finished product contain this acid? Why does the finished product contain hydrochloric acid?

Nitric acid is used as an oxidizing agent to change ferrous chloride to ferric chloride.

It does not contain nitric acid.

It contains hydrochloric acid to prevent the formation of the oxychloride.

Give per cent of active constituent in each of the following:

(*a*) Tully's powder. (*b*) Wine of opium. (*c*) Oleate of mercury. (*d*) Prussic acid. (*e*) Syrup of iodide of iron. (*f*) Ointment of zinc oxide.

(*a*) 1½%. (*b*) 10%. (*c*) 25%. (*d*) 2%. (*e*) 5%. (*f*) 20%.

For interpretation, comment and criticism:

(a) ℞.	Sodii boras	ʒij
	Chloralis	ʒij
	Syrupi	℥j
	Aquæ q. s. ad.	℥iij.

Misce. Sig. ʒj every three hours.

(b) ℞.	Strych. sulph.	℈ss
	Potassii bromidi	ʒjss
	Glycerini	℥ss
	Aquæ q. s. ad.	℥ij

Misce. Sig. ʒj 3 times a day.

(c) ℞.	Acidi chromici	℈ss
	Spt. vini. rect.	℥j

Misce. Sig. External use.

(d) ℞. Potassii iodidi .... ℈j
Liq. ferri chloridi .... ʒj
Glycerini .... ℥ij
M. S. External use.

(A) The alkaline sod. borat. decomposes the chloral, forming chloroform and an insoluble sod. formate. The preparation would be useless therapeutically, and if dispensed would need a "shake" label. It had best not be filled. Consult the writer.

(B) The reaction between strych. sulph. and potassii bromidi throws down the insoluble strych. bromide. As it stands, ⅝ grain is far too large a dose of the strychnine; also the two drugs are therapeutically antagonistic. It should not be filled as written.

(C) This prescription would be dangerous to compound; because of the oxidizing power of the chromic acid on the alcohol, it would form an explosive compound. Water should be the solvent here.

(D) Potassium iodide is incompatible with the free acid of the solution of ferric chloride, which would throw out the iodine. If dispensed, you would mix the glycerin with the liq. ferri chloridi and then the iodide of potassium, and use a "shake" label.

Name a syrup made by maceration and one by digestion.

Maceration = syrup of wild cherry. Digestion = syrup of acacia.

Outline process of each.

In syrup wild cherry the ground drug is macerated in a percolator, and then exhausted by percolation with water and glycerin, and the sugar dissolved in the percolate by agitation.

Syrup of acacia is made by adding water to the acacia and stirring it occasionally until dissolved. Then add sugar and place on water-bath and heat until it dissolves. Lastly, strain.

What is the official title for lime water?

Liquor calcis.

How should it be prepared?

Slake the lime and add water to dissolve the soluble impurities. Then decant and discard the water. To the residue add water and filter. This is a saturated solution.

What spirit is made by chemical reaction?

Spiritus aetheris nitrosi.

What is Spts. Mindererus? Give official name? How is it made?

Liquor ammonii acetatis. It is an aqueous solution of ammonium acetate made by adding ammonium carbonate to diluted acetic acid and stirring until dissolved.

How would you clean a graduate in which you had dispensed (a) castor oil. (b) Balsam of fir.

(a) Alcohol. By washing with alcohol, then soap and water.

(b) Ether. By washing with ether, then soap and water.

What is a water-bath? Describe its uses and give the degree of temperature obtained.

A water-bath is a capsule containing water in which is placed another capsule containing the article in use. Heat is applied to the outer vessel, which in turn keeps the second capsule at a uniform temperature, less than the water.

It is used in digestion or slow evaporation. Highest temperature that of boiling water, 212° F.

(A) What are alkaloids? (B) Name five (5) giving their properties and uses; also drugs from which derived? (C) How obtained?

(A) Alkaloids are the active principles of plants, having the power of uniting with acids to form salts. Mostly crystalline, and solid and stable.

(B)

	Properties and Uses.	*Obtained From.*
Strychnine	Nerve stimulant and tonic	Nux vomica.
Morphine	Sedative and anodyne	Opium.
Quinine	Tonic, antiperiodic, antimalarial	Cinchona.
Caffeine	Nerve tonic, cerebral stimulant	Coffee, tea, guarana.
Cocaine	Local anesthetic and cerebral stimulant	Coca.

(C) Obtained by extraction from the respective drugs with suitable solvents, then evaporating the solution and precipitating or crystallizing the alkaloïd.

Reduce five gallons of alcohol to 40 per cent alcohol. How much water will it take, and how many gallons will result?

40% of the mixture = 5 gal. alcohol.
60% of the mixture = 7½ gal. water.

100% = 12½ gallons finished product, not allowing for the small contraction in volume, which is about 5%.

What is distillation?

The process of vaporization and subsequent condensation of a volatile liquid.

Sublimation?

The vaporization and condensation of a solid.

Calcination?

The process of separating volatile substances from inorganic matter, by applying heat without fusion.

Oxidation?

The process of the atomic combination of oxygen with any other element; and as a rule this raises the valence of the substance from a lower to a higher basis.

Name an official product resulting from each.

Distillation = alcohol. Sublimation = camphor. Calcination = calx. Oxidation = liquor ferri chloridi.

What is sterilization and why is it used? How could you sterilize (a) water—(b) milk—(c) cotton?

Sterilization is the process of killing germs and their spores by heat. It is used to preserve the substance or render it aseptic.

(a) Water, by boiling ten minutes. (b) Milk, by placing in a water-bath for 15 minutes. (c) Cotton, by dry heat for several hours at 300° F. or steam under pressure.

What is the dispensatory, the pharmacopoeia, the national formulary; from what sources have they been obtained?

The Dispensatory is a commentary on the Pharmacopœia.

The Pharmacopœia is a list of medicinal substances having the sanction of authority.

The National Formulary is a list of recipes of medicinal compounds not found in the Pharmacopœia but which are in frequent use.

The Dispensatory is written by specialists, who aim to comment on the entire U. S. Pharmacopœia and also on those drugs official in other Pharmacopœias, that are universally used. The Pharmacopœia is written by a representative body of pharmacists and physicians, botanists and chemists, who determine what shall be admitted, and who aim to list those drugs in most frequent use throughout the country. The National Formulary is written by pharmacists (American Pharmaceutical Association) with a view to supplement other recipes to be used in the compounding room.

Write out in Latin terms and metric system the following prescription, and state for what purpose prescribed?

℞. Syr. wild cherry
Syr. squills co. .... of each 2 ounces
Am. mur. C. P. .... ½ dram
Glycerin ....q. s. ad. ft. 6 ounces.
M. Sig. Teaspoonful three times a day.

℞. Syrupi pruni Virginianæ
Syrupi scillæ compositi..............aa 60
Ammonii chloridi C. P. 2
Glycerini ....q. s. ad. ft. 180
M. Sig. f ʒ j ter in die. It is used for a cough.

Give the formula for preparing spirits camphor.

Camphor, 100 gm.; alcohol, 1000 C.c.

Give the formula for preparing tincture of opium, Dover's Powder, compound chalk powder.

Tincture of Opium.	
Granulated opium	100 gm.
Alcohol	
Water	
Diluted alcohol of each q. s. 1000 C.c.	

Dover's Powders.	
Pdr. opium	10
Pdr. ipecac	10
Sugar of milk	80

Compound Chalk Powder.	
Prepared chalk	30
Powdered acacia	20
Powdered sugar	50

A customer sends an order as follows: "Please send me one bottle of Harlemensis; 5 cents worth of salts; 1 cake of *Magnesia*; 10 cents worth of turpentine; 4 pounds brimstone; 1 pint pine tar; 12 5-grain powders for fever, and 25 cents worth of postage stamps. Send bill with goods, bearer will pay you. *Mrs. Mayberry*."

Make out bill and receipt same, giving amount of each article you would give, and price of same.

MRS. MAYBERRY, Dr., to JOHN SMITH, Druggist.

JANUARY 1ST, 1900.

1 bottle haarlem oil	$0.10
4 oz. Epsom salts	.05
1 oz. cake magnesia	.05
6 oz. spirit turpentine	.10
4 lb. sulphur roll	.25
1 pt. pine tar	.25
* 1 doz. 5 gr. quinine sulphate powders	.25
Stamps	.25
	$1.30

Received payment, (Signed) JOHN SMITH.

* It is surmised that the druggist has had previous orders from Mrs. Mayberry for fever powders, otherwise it would be his duty to investigate before sending anything.

By what authority are pharmacopoeias published?

In most countries by governmental authority. In the United States by an elected body of pharmacists and physicians from the various colleges and associations.

What substances are called "official" and what "non-official?"

Official substances are those recognized by the Pharmacopœia, while non-official are those not so recognized.

How is the metre obtained?

By computing the $\frac{1}{40000000}$ part of the earth's circumference at the poles.

What is it equal to in feet and inches?

3 ft. 3⅜ inches.

Write and add together—

Four grammes	4.00
Two dekagrams	20.00
Five decigrams	0.50
One kilogram	1000.00
Six centigrams	0.06
	1024.56

Convert into avoirdupois ounces and grains—

1024.56 grams
15.4 grains = 1 gram

4098.24
512280
102456

15778.224 grains.

437.5 gr. in 1 oz.)15778.224(36 oz. 282.24 grains.
13125

26532
26250

282.24

An ounce of water at 60 degrees F. is equal to how many grams?

15.4)455.7(29+
308

1477
1386

Ans. 29 grams.

How many C.c. in one liter?

1000.

How would you take the specific gravity of (a) glycerin, (b) alcohol, (c) iron?

(a) Bring glycerin to 70° F. and fill a specific gravity bottle to the mark. Then weigh it. If it is a 1000-grain bottle it should weigh 1,246 grains, showing a specific gravity of 1.246.

(b) Alcohol would be estimated the same way, always pointing off three places for the decimal mark.

(c) Weigh the sample in air. Then weigh it suspended by a horse-hair in water, and divide the weight in air by the loss of weight in water. The result is its specific gravity.

Explain what is meant by precipitation, crystallization, evaporation?

Precipitation is the act of separating solids from a solution by the use of heat, light, or chemical reaction.

Crystallization is the process of forming definite shape to a substance in solution by evaporating the solvent, whereby it is bounded by geometric surfaces.

Evaporation is the process of separating a volatile liquid from a solution by heat, the non-volatile portion being the object sought.

Give percentage strength of official tincture of digitalis; its dose, also what precaution necessary as to age in selection of the herb.

10 per cent. Average dose, 15 minims. The herb should be in its second year's growth.

How much cocaine would you take to make three and a half fluid ounces of a three per cent aqueous solution?

47.8 grains cocaine.

To make a pint of a one per cent solution of carbolic acid. How much carbolic acid would you take?

72.91 grains carbolic acid.

How much mercuric chloride would you take to make two pints of a one to two thousand (1:2000) solution.

7¼ grs. mercuric chloride.

What solvent do you consider best for—

Gum arabic = water.
Gum mastic = alcohol.
Gum opium = diluted alcohol.
Cocaine alkaloid = alcohol.

Convert 20 degrees centigrade to Fahrenheit.

$$\begin{array}{r} 20 \text{ deg. C.} \\ 1.8 \\ \hline 36.0 \\ 32 \\ \hline 68 \text{ degrees.} \end{array}$$

Rule:
C.° × 1.8, then add 32 = F.°.

Ans. 68 degrees F.

How many pills four (4) grs. each can be made out of a half kilogram of quinine sulphate?

$$\begin{array}{r} 500 \text{ grams quinine sulphate.} \\ 15.4 \text{ grs.} \\ \hline 2000 \\ 2500 \\ 500 \\ \hline 4)7700.0 \\ \hline 1925 \text{ pills.} \end{array}$$

1925 pills. Answer.

Give the official name for Rochelle salt.

Potassii et sodii tartras.

Give the source of menthol.

Oil of peppermint.

Give the source of salicin.

The bark of the poplar and the willow.

Give the source of naphthalin.

Coal tar.

Give the common name for the compound mixture of glycyrrhiza.

Brown mixture.

Name the ingredients used in making syrup of squills compound.

Fluid ext. squill, fluid ext. senega, antimony and potassium tartrate, sugar, purified talc, water.

Name the ingredients used in making spirits ammonia arom.

Ammonium carbonate, ammonia water, oil of lemon, oil of lavender flowers, oil of myristica, alcohol, distilled water.

Name the ingredients used in making compound cathartic pills.

Compound extr. of colocynth, calomel, resin of jalap, gamboge, diluted alcohol.

Name the ingredients in a seidlitz powder and how made.

Tartaric acid, bicarbonate of soda and rochelle salts.

The tartaric acid is wrapped in a white paper, and the two other ingredients are mixed and wrapped in a blue paper.

Name the ingredients used in making camphor liniment.

Camphor and cotton-seed oil.

Name the ingredients used in making syrup iodide iron.

Iron wire, iodine, water, syrup, diluted hypophosphorous acid.

Give the official name for diachylon plaster.

Emplastrum plumbi.

What would you dispense if solution of persulphate of iron were called for?

Liquor ferri subsulphatis, U. S. P.

What excipient is ordinarily used in making suppositories?

Cacao butter.

What is the official name for black draught?

Infusum sennae compositum.

How much opium does a teaspoonful of laudanum represent?

Six grains.

What objection is there to making syrups by the addition of tinctures or fluidextracts to syrup?

A cloudy mixture results, due to precipitation of the part of the drug dissolved out by the alcohol of the tincture or fluidextract.

What is the difference between a spirit and a tincture?

A spirit is an alcoholic solution of a volatile substance, while a tincture is usually non-volatile (iodine excepted).

What per cent of arsenic does Fowler's solution contain?

One per cent.

What is Donovan's solution?

Liquor arseni et hydrargyri iodidi.

How many minims in one hundred cubic centimetres.

1623.

How much opium in ten grains Dover's powder?

1 grain.

What is meant by fractional distillation?

The process of separating by distillation, substances having different boiling-points.

What is a menstruum?

The liquid used to extract the soluble portions of drugs.

What is maceration?

The process of allowing a drug to be in contact with the menstruum previous to percolation.

What is the difference between elixirs and syrups?

Elixirs contain alcohol and but a small amount of medicine. Syrups do not contain alcohol, but solutions of medicinal substances in sugar and water, and are stronger medicinally.

What is the difference between collodion and flexible collodion?

Flexible collodion contains in addition castor oil and Canada turpentine.

What should the strength of an infusion be when not directed by physician or pharmacopoeia?

Five per cent.

How are decoctions made?

By boiling the drug in water for fifteen minutes, cool, express and strain.

Which is official, tincture colchicum seed or tincture colchicum root?

Tr. colchicum seed.

Criticize the following prescription, telling how you would mix the solution and what the result in any case would be:

℞.	Spt. aetheris nit.		oz. i
	Spt. menth. pip.		dr. i
	Tr. aconite rt.		gtt. ii
	Sat. sol. magnesium sulph.	q. s.	oz. iv.

M. Sig.—f.ʒ 1 t. i. d.

The prescription would have a precipitated magnesium sulph., due to its insolubility in the alcohol of the spt. aetheris nit. The dose of tr. aconite is useless, as it is too small. Add the tr. aconite and spt. menth. pip. to the spt. aetheris nit. and put in a four-fluid-ounce bottle, filling it with sat. sol. magnesium sulph. Use "shake" label. It is an undesirable combination.

What is the weight in grains of the apothecaries and avoirdupois drachm?

Apothecaries drachm equals 60 grains. No such denomination in the avoirdupois system of weights.

What of the ounce.

Apothecaries equals 480 gr. Avoirdupois equals 437.5 gr.

What of the pound?

Apothecaries equals 5,760 gr. Avoirdupois equals 7,000 gr.

What of the British and United States fluid ounce?

British, 437.5; U. S. 455.7.

What of the British and the United States gallon?

British equals 70,000 grains. United States equals 58,333⅓ grains.

What do you understand by (a) Deliquescence, (b) Efflorescence?

(a) Deliquescence is the property held by some solids of absorbing moisture from the air.

(b) Efflorescence is the act of giving off the water of crystallization at the ordinary temperature.

Liniments: Define the term. Give full official title for each of the following: (a) Volatile liniment. (b) Carron oil. (c) Soap liniment. (d) Liniment of soft soap.

Liniments are solutions of drugs in oily or alcoholic liquids intended for external use by rubbing.

(a) Linimentum ammoniae. (b) Linimentum calcis. (c) Linimentum saponis. (d) Linimentum saponis mollis.

How does an infusion differ from a decoction?

The decoction is boiled fifteen minutes. The infusion is not boiled, but the boiling water is placed on the drug and cooled.

What are fluidextracts? (b) Give average strength. (c) Name five official fluidextracts and give dose of each.

(a) Fluidextracts are liquid alcoholic preparations of drugs made by percolation and evaporation of a portion of the percolate so that a given quantity of finished product represents a definite amount of drug.

(b) The average strength is, one gram of drug equals one cubic centimeter.

(c) Fluidextractum ergotae, 30 minims; fluidextractum rhamni purshianae, 15 minims; fluidextractum aromaticum, 15 minims; fluidextractum digitalis, 1 minim; fluidextractum rhei, 15 minims.

Name two official spirits made by simple solution.

Spiritus camphorae, spiritus aetheris.

Name an official spirit made by solution with maceration.

Spiritus menthae piperitae.

One by gaseous solution.

Spiritus ammoniae.

One by chemical reaction.

Spiritus aetheris nitrosi.

One by distillation.

Spiritus frumenti.

What is a pill mass?

That soft, pliable, adhesive mass containing medicinal ingredients to be made into pills.

How much of a solution of strychnine sulphate, one in sixty, should be added to a 12 ounce mixture so that each teaspoonful would represent 1-30 gr.

Ans. 3 drachms, 12 minims.

How much of a triturate, one in eight, of arsenous acid is required to make 175 pills, pills of 1-25 gr. each?

56 grains.

How many tinctures are official?

Sixty-four.

Name the process by which each of the following tinctures are made, (a) tr. iodine, (b) tr. opium, (c) tr. benzoin.

(a) Simple solution. (b) Maceration and percolation. (c) Maceration and filtration.

Name a tincture with a menstruum of alcohol.

Tinctura veratri.

Name a tincture with a menstruum of dilute alcohol.

Tinctura arnicae.

Name a tincture which contains (a) glycerin, (b) an acid, (c) arm. spts. ammonia.

(a) Tr. cardamomi comp. (b) Tr. sanguinariae. (c) Tr. guaiac ammoniated.

Give process for making (a) citrine ointment, (b) Goulard's cerate.

(a) Heat the lard oil and add nitric acid gradually. When reaction lessens, slowly apply heat until effervescence ceases. Cool and add the mercury dissolved in nitric acid, stirring with a wooden spatula until of a citrine color. Avoid metal vessels.

(b) To the melted wool-fat in a warmed mortar gradually add the solution of lead subacetate and triturate. To this mixture add the white petrolatum and paraffine melted, and in which the camphor is dissolved; mix thoroughly.

What is the best solvent for (a) iodide of potash, (b) calomel, (c) sulph. morphine, (d) sulph. quinine, (e) sulph. strychnine?

(a) Water. (b) Insoluble except in strong acids. (c) Water. (d) Alcohol. (e) Water.

Give official name of (a) Monsell's solution, (b) Basham's mixture, (c) Lugol's solution.

(a) Liquor ferri subsulphatis. (b) Liquor ferri et ammonii acetatis. (c) Liquor iodi compositus.

Define the term "Emulsion."

Emulsions are liquid preparations in which fats, oils or oleoresinous substances are suspended in water by the intervention of some gummy or mucilaginous substance.

How is ammoniated mercury prepared?

Dissolve bichloride of mercury in warmed distilled water, filter, and pour under constant stirring into ammonia water. Collect and wash the precipitate, and dry.

How much of each constituent is required to make five hectograms of the ointment?

Ammoniated mercury, 50 grams; white petrolatum, 250 grams; hydrous wool-fat, 200 grams.

Why are some drugs packed firmly and others loosely?

To allow a proper rate of flow in percolation so that the drug will be exhausted. A porous drug is packed firmly to prevent too rapid dropping, while a dense one is loosely packed to prevent clogging of the orifice.

Define colation.

Colation or straining is the process of separating a solid from a liquid by placing the mixture on a piece of muslin, allowing the liquid to drain through, and retaining the solid.

How many grams of iodine ointment can be made from 20 grams of iodine? What other materials are required?

500 grammes. Potassium iodide, glycerin and benzoinated lard.

Describe the process of re-percolation. Name the class of galenicals in the preparation of which the pharmacopoeia authorizes the employment of this process.

This is the process of percolating drugs with percolates.

Its object is, saving alcohol by passing the weaker percolate from one portion to another portion, and again from this second to a third.

It may be used in making fluidextracts.

What is the effect of time and light upon tinctures, fluidextracts and essential oils?

Age and light have little or no effect on tinctures and fluid extracts, although tinctures are more permanent than fluid extracts, some form of precipitates often containing active matter present. Essential oils are destroyed by exposure to light and time. Ozone develops, and they thicken and lose their odor.

How do you distinguish between fixed and volatile oils?

Fixed oils leave a permanent stain on blotting paper. Volatile oils do not. Fixed oils are saponifiable, while volatile oils are not. Volatile oils are solvent for fixed oils. Ozone develops in volatile oils by age and light, but it does not develop in fixed oils.

Distinguish the fixed from the volatile oils in the following:

(a)	Betula,	volatile.
(b)	Benne,	fixed.
(c)	Chenopodium,	volatile.
(d)	Jecoris aselli,	fixed.
(e)	Sandal wood,	volatile.
(f)	Fleabane,	volatile.
(g)	Neroli,	volatile.
(h)	Theobroma,	fixed.
(i)	Croton,	fixed.
(j)	Bitter almonds,	volatile.

Name the ingredients and the process of preparing Basham's mixture.

Tincture ferric chloride, diluted acetic acid, solution ammonium acetate, aromatic elixir, glycerin, water.

To the solution of ammonium acetate add successively diluted acetic acid, tincture ferric chloride, aromatic elixir, and glycerin; lastly, the water.

What chemical reaction occurs in preparing the mixture?

The ferric chloride is changed to acetate by the acetic acid.

What is the weight in grains of 2 fluid ounces of ether?

652 grains.

Give the process for preparing liquor plumbi subacetatis. Why is distilled water used?

Mix lead oxide with the solution of lead acetate and boil half an hour, occasionally stirring; when cool, filter and add distilled water up to quantity desired. Distilled water is used to exclude other metals in solution in ordinary water, and also to prevent cloudiness from carbonic acid, either of which would cause precipitation of a certain portion of the lead.

In making Burrow's solution two parts of lead acetate and one part of alum are used to eight parts of water. When the solutions of lead acetate and alum are mixed, a heavy white precipitate is formed, which is directed to be filtered out and rejected. What is the rejected precipitate?

Lead sulphate.

Why is it separated from the solution?

Because it is inert and unsightly.

What two salts remain in solution?

Aluminum acetate and potassium acetate.

What is Burrow's solution used for?

As an astringent lotion.

Demonstrate by chemical equation the reaction which takes place between lead acetate and alum in solution.

$$2Pb(C_2H_3O_2)_2 + Al\,K(So_4)_2 = 2Pb(So_4)Al\,K(C_2H_3O_2)_4.$$

Give the Latin official name for tar.

Pix liquida.

Describe it pharmaceutically.

A semi-liquid, viscid, black in color, empyreumatic odor, acid reaction.

How is it prepared?

By destructive distillation of the wood of the pinus palustris.

What are its medicinal properties?

Expectorant internally, and locally stimulant. Used in skin diseases.

Name the official preparations made from it.

Syrupus picis liquidae, unguentum picis liquidae.

Give the maximum single dose of the following remedies.

Diluted hydrocyanic acid	5 M.
Tincture of arnica	60 M.
Tincture of nux vomica	30 M.
Tincture of digitalis	30 M.
Tincture of belladonna	20 M.
Extract of opium	1 gr.
Morphine sulphate	½ gr.
Strychnine sulphate	1/20 gr.
Apomorphine hydrochloride	⅛ gr.
Atropine sulphate	1/60 gr.

Write a four ounce prescription in metric terms so that each teaspoonful will contain approximately two grains of quinine sulphate, 1 1-2 gr. iron phosphate, 1-30 gr. strychnine sulphate and 1-20 gr. arsenious acid.

℞.	Quininæ sulph.	4	0
	Ferri phosphatis	3	1
	Strychninæ sulph.	0	065
	Arseni trioxidi	0	100
	Elix. aromat. q. s.	120	00

M. S. fʒi t. i. d. Dr. S.

What class of fluid preparations U. S. P. have the definite strength of one liter of the product to one kilo of the drug?

Fluidextracts.

Give the process of making.

Moisten 1000 grams of powdered drug with suitable menstruum and pack in a suitable percolator with enough menstruum to saturate and leave a layer above the drug. When the liquid drops, close the outlet and cover the percolator, and macerate a specified length of time. Then percolate with additional menstruum until exhausted, reserving the first 800 C.c. and evaporating the remainder to a soft extract, which is dissolved in the reserved portion and menstruum added to make 1000 C.c.

Name two in which acetic acid is used and for what purpose.

Fluidextracts of sanguinaria and squill. It is added to form soluble salts with their alkaloids and increase their efficiency by dissolving them.

Name one in which ammonia water is used and for what purpose.

Fluidextractum glycyrrhizae. It is used to develop the sweet taste by combining with the glycyrrhizin.

Syrupus senegae; name the chemical used in its preparation.

Potassium hydroxide.

What purpose does it serve?

It dissolves and holds in solution the pectin of the drug and thus prevents gelatinization.

Potassium acetate; state how it may be prepared.

By adding crystals of potassium bicarbonate to acetic acid until effervescence ceases. Then acidulate with a few drops of acetic acid and evaporate to dryness cautiously in a porcelain dish on a sand-bath. Be careful not to use iron utensils.

What change does it undergo upon exposure to air?

It deliquesces.

Liquor ferri chloridi; name all the materials used in its manufacture.

Iron, hydrochloric acid, nitric acid, distilled water.

Name its official preparation.

Tincture of ferric chloride.

Criticize, comment and interpret the following:

℞.	Ac. carbolic	
	Sodii boratis	aa ʒi
	Cocainæ hydrochlor.	gr. xii
	Aquæ	ad. ℥ix.

M. Sig.—Spray.

Answer: In this prescription we have the precipitation of the cocaine by the action of the sodium borate, which would make it impossible to spray without filtering it out of the preparation.

℞.	Antipyrin	℈i
	Morphine sulph.	gr. 16
	Syr. tolu	ʒiv
	Spt. ætheris nitrosi	ʒii
	Syr. pruni virg.	ad. ℥ii.

M. Sig. f.ʒ. 1 ev. 2 hours.

The dose of morphine here is one grain, which is far too much. The action of the antipyrin on spt. etheris nitrosi causes a green color, due to the formation of iso-nitroso-antipyrin.

℞.	Hydrarg. chlorid	gr. ii
	Tr. cinchonæ comp.	℥iii
	Spt. ammon. aromat.	℥i.

It is indefinite which chloride of mercury is wanted, mild or corrosive. There is no dose appended and no direction, and should not be dispensed for this reason alone. Then if the bichloride is used, which is reasonable, it means precipitation of the cinchona alkaloids. The alkaline spt. ammon. aromat. decomposes the mercury salt, forming calomel in the presence of light.

℞.	Menthol	gr. xv
	Camphor	gr. x
	Pulv. talcum	ʒi
	Pulv. acacia	ʒiii.

Misce secundem artem.

Sig.—Coryza powder. Use as directed.

It is well known that a mixture of menthol and camphor will form a liquid; how would you compound the above without such an undesirable result?

Mix the talcum and acacia, and then mix the menthol with half, and the camphor with the other half, and then mix the two.

What is the meaning of secundem artem?

According to art.

Give a working formula for making 8 fluid ounces of emulsion of castor oil with acacia, containing 50 per cent of oil, a sufficient quantity of aromatics and sweetening material to make it palatable?

℞.	Ol. ricini	℥iv
	Pulv. acaciæ	℥j
	Aquæ cinnamoni	℥ii
	Ol. gaultheriæ	ʒss
	Syrupi	℥ii.

M. Ft. emulsio.

Give a working formula for making one pint of emulsion of cod liver oil with glycerite of yolk of egg to contain 50 per cent of oil, 12 1-2 per cent of Jamaica rum and sufficient aromatics and sweetening to make it palatable?

℞.	Olei morrhuæ	℥viii
	Glyceriti vitelli	℥iv
	Jamaica rum	℥ii
	Ol. gaultheriæ	ʒi
	Syrupi	℥ii.

M. Ft. emulsio.

How would you prepare this prescription?

℞.	Calomelan	.1
	Saccharum	.5

D. tal dos. No. 2.
Sig.—Take as directed.

Triturate the calomel well with a small amount of sugar. Gradually add the remainder of the sugar and continue triturating until well mixed, and send two of such powders.

Give the official Latin name for the first ingredient.

Hydrargyri chloridum mite.

Give one common name by which the first ingredient in this prescription is known in the arts?

℞.	Hydrargyri sulphureti rubri	1	0
	Sulfer sublimati	24	0
	Petrolati	75	0

M. fiat ungt. ds. Use locally.

Vermillion.

Give official Latin name for the second ingredient.

Sulphur sublimatum.

Write in words the quantities of each ingredient prescribed.

Hydrargyri sulphureti rubri, one gramme; sulfer sublimati, twenty-four grammes; petrolati, seventy-five grammes.

What sized jar will hold the ointment?

Four ounces.

What charge would you make for dispensing this prescription?

Fifty cents.

How should phosphorus be kept and why?

Under water to prevent oxidation.

How should bromine be kept and why?

In glass-stoppered bottles in a cool place, to prevent evaporation.

How should iodine be kept and why?

In glass-stoppered bottles in a cool place, to prevent evaporation.

Why are pills of ferrous iodide directed to be coated with balsam of tolu by the U. S. P.?

To prevent oxidation.

Why are pills of phosphorus directed to be coated in a like manner?

To prevent oxidation.

Why does the pharmacopoeia (in its formula for troches of potassium chlorate) direct that the sugar and the tragacanth shall be triturated together and then transferred to a sheet of paper and by means of a bone spatula mixed with the powdered potassium chlorate?

To prevent possible explosion from oxidation of the potassium chlorate.

Why should troches of santonin be kept in dark amber colored bottles?

The santonin is liable to discolor in free air, and also it may oxidize in the presence of light, and these means prevent this trouble.

Why should a wood or porcelain spatula be used in making sodium salicylate or its solution, and why is glass wool preferred to ordinary filter paper for filtering a solution of the sodium salicylate?

The slightest amount of iron will discolor the product, and the impurities in ordinary filter paper make it unfit for this purpose.

Why should resorcin be kept in dark amber colored bottles?

It darkens in sunlight.

With what substances are pills usually coated in order to conceal odor and taste?

Sugar, chocolate, gelatin, silver leaf, salol, etc.

What is pearl coating and how is it done?

French chalk is used in this case by placing pills moistened with an adhesive mixture in a box with a little sugar and French chalk, and rotating until coated.

Describe the process for silver and gold coating.

Place a drop of syrup acacia in a mortar and smear well with the finger. Now drop in pills and rotate until the surface is completely covered; then drop them in the coater containing the gold or silver leaf and again rotate until covered.

Why are some pills coated with keratin, salol, or shellac, and how is it done?

This is done to prevent solution in the stomach when the pill is intended for its action in the intestines. The finished pill is rotated in a mortar with melted salol or solution of keratin until coated, then dried in air and cooled.

Are pills improved by being coated?

Yes.

The U. S. P. gives fourteen formulas for pills only two of which it directs shall be coated; state the two exceptions, state how they are coated and why?

Pilulae ferri iodidi and pilulae phosphori. These pills are shaken in an ethereal solution of balsam of tolu until uniformly coated and then dried. To prevent oxidation.

Give the unabbreviated official name for the following preparations:

Blaud's Pills,	Pilulae ferri carbonatis.
Citrine ointment,	Unguentum hydrargyri nitratis.
Brown Mixture,	Mistura glycyrrhizae composita.
James' Powder,	Pulvis antimonialis.
Pulvis Purgans,	Pulvis jalapae compositus.
Monsell's Solution,	Liquor ferri subsulphatis.

Give the Latin name and a description of the following: (a) draught, (b) drops, (c) lotion, (d) eye-water, (e) spray.

(a) Haustus. An aqueous mixture of drugs to be taken at one dose.

(b) Guttae. A solution of substances to be used in drop doses. Usually as an eye-water.

(c) Lotio. An aqueous or semi-alcoholic mixture for external use.

(d) Aqua ophthalmicus. An aqueous solution of substances intended for local use in the eye. The term collyrium is also used.

(e) Liquor vaporosus. An aqueous or oily solution of medicinal substances intended for use in a nebulizer or atomizer.

What is an emulsifying agent?

That substance used to suspend the oil in the mixture.

Name some of the more prominent emulsifiers.

Acacia, yolk of egg, chondrus.

What are the advantages and disadvantages of using condensed milk and yolk of egg as emulsifiers?

These are natural emulsions, and have the advantage of more readily forming emulsions of oils as they act as a nucleus. The disadvantage is that they are readily decomposed and tend to spoil the emulsion.

Name four official emulsions giving their emulsifying agents, where any are used and give a reason for not using a special emulsifyer in others.

Emulsum amygdalae, asafœtidae, chloroformi, olei terebinthinae. The emulsifyer in emulsum amygdalae is acacia; in emulsum olei terebinthinae and chloroformi is expressed oil of almond and tragacanth. There is no emulsifyer used for emulsum asafœtidae, because the water unites with the gum already present and forms the emulsion.

The following Latin abbreviations are frequently used in writing prescriptions. Write them out in full and translate them into English.

(1) aa: ana: of each.
(2) abs. feb.: absente febre: in the absence of fever.
(3) ad hib.: adhibendus: to be administered.
(4) ad lib.: ad libitum: at pleasure.
(5) aq. bull.: aqua bulliens: boiling water.
(6) ft. haust.: fiat haustus: make a draught.
(7) ft. emp. vesc.: fiat emplastrum vesicatorum: to make a blister.
(8) omn. hor.: omni hora: every hour.
(9) Part aeq.: partes aequales: equal parts.
(10) pro r. n.: pro re nata: occasionally.

Give the important solid constituents of healthy human urine.

Urea, uric acid, sulphates, phosphates, chlorides.

What is the average daily quantity passed by a healthy adult?

1500 C.c.

What quantity of total solids does that represent?

1000 grains.

If the quantity of urine passed in 24 hours is much in excess of the average daily amount passed in health, what would you suspect and look for?

Drinking large amounts of fluid, or diabetes, or hysteria.

If considerably less than normal, what would you suspect and look for?

Free sweat, diarrhœa, abstinence of drinking fluids, Bright's Disease, retention, obstruction, cirrhosis of the liver.

Give specific gravity of healthy urine.

Ans. 1.020.

Urine containing sugar?

Ans. 1.050.

Urine containing albumen?

Ans. 1.004.

Give one or more qualitative tests for the presence of either sugar or albumen.

Albumen test: Heat the sample acidified with nitric acid. If a precipitate forms, insoluble in excess, positive.

Sugar test: Boil the urine with Fehling's Solution (alkaline cupric tartrate). If red coloration and precipitation of oxide production, the sugar is present.

Translate this prescription into English, giving the weight of the ingredients in grains. If you were about to prepare this prescription with metric weights and the smallest weight you had was that of the ten milligrams, how would you proceed to obtain the required amount of colchicin, for the prescription?

℞.	Colchicine	0.0005
	Natri salicylati	0.6

M. ft. pulvis, tales doses, No. xv.
Sig. One powder three times a day. Dr. C.....

Answer:

℞.	Colchicine	$\frac{1}{120}$ gr.
	Sodium salicylate	9¼ gr.

Mix and make xv powders of such dose.
Sig.—One powder three times a day. Dr. C.....

I would weigh the ten milligrams and with a spatula separate one-fourth of that, and use the other three-fourths, or 7.5 milligrams, which is the quantity required for the fifteen doses.

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Give the full Latin names and give the ingredients of each of the following:

(1) Javelle water. (2) Labarraque's Solution. (3) Yellow wash. (4) Black wash. (5) Lugol's Solution.

(1) Liquor potassae chlorinatae, potassium carbonate, chlorinated lime, water.

(2) Liquor sodae chlorinatae, monohydrated sodium carbonate, chlorinated lime, water.

(3) Lotio flava, bichloride of mercury, boiling water, lime water.

(4) Lotio nigra, calomel, water, lime water.

(5) Liquor iodi compositus, iodine, potassium iodide, distilled water.

How is the glycerite of boroglycerin prepared?

Heat glycerin, and add the boric acid in several portions, stirring constantly. When all is added, continue to heat, stirring to break the film that forms. When reduced to the proper weight add glycerin and mix.

What per cent of boroglyceride does it contain?

Fifty per cent.

Describe boroglyceride.

It is in semi-transparent, flat pieces, smooth to the touch, soluble in water and glycerin.

How is boroglyceride prepared?

Heat glycerin and add the boric acid gradually under constant stirring. When reduced to the proper weight, it is poured on a slab having a small portion of petrolatum on it, allowed to cool and cut in pieces.

What are its therapeutic properties?

Boroglyceride is used only to make the boroglycerin. Antiseptic and astringent.

℞. L. & O. .... ℥vi.
Sig.—Poison. Use as directed. Dr. O.....

How would you dispense the above prescription and what precaution would you take?

Add an ounce each of tinctura opii and liq. plumbi subacetatis dilutus to enough water to make a pint. It should be labeled "shake."

℞. Ungt. kali iodidi.................. 10 p. c.
Ungt. ichthyoli.................. 10 p. c.
Ungt. natri salicyl.................. 10 p. c. ana ℥ ss.
Misce fiat ungt. Sig.—For external use. Dr. B.....

State how you would prepare this prescription. Translate all into English and give all the component parts in grains.

Answer:

℞. Ointment potassium iodide........ 10 %
Ointment ichthyol................ 10 %
Ointment sodium salicylate. ...... 10 % of each ℥ ss.
Mix and make ointment of proper consistence. For external use. Dr. B.....

Take 24 grs. Potassium Iodide and $\frac{4}{10}$ gr. Potassium Carb. dissolved in 24 gtt. water and incorporate with benzoinated Lard, q. s. ℥ ss. Take 24 gr. Ichthyol and incorporate with Petrolatum, q. s. ℥ ss. Take 24 gr. Sodium Salicylate and incorporate with Petrolatum, q. s. ℥ ss. Lastly, thoroughly mix all three.

From what and how is glycerin made?

From fats by decomposition.

Briefly describe its physical properties.

A clear, colorless, syrupy liquid, rather thick, and smooth to the touch. It is sweet and odorless.

What adulterations and impurities may be found in it?

Mineral impurities, sugars and sulphuric acid.

Give some tests for its purity.

Its specific gravity should be 1.24. Heat to boiling on a foil of platinum, then ignite, it should leave only a stain, no ash, and should completely disappear on further heating. This shows the absence of metals. Barium chloride t. s. should form no precipitate, showing the absence of sulphates or sulphuric acid.

Give its specific gravity.

1.24.

Why is glycerin used in some fluidextracts and not in others, and why is it frequently incorporated with solid extracts?

Because glycerin is found to dissolve the active ingredients of some drugs better than either alcohol alone or other menstrua, and it prevents precipitation of certain constituents, especially tannic acid. It is added to solid extracts to prevent drying, on account of its hygroscopic powers.

What is spiritus glycerylis nitratis?

An alcoholic solution of one per cent glycerin trinitrate.

What percentage of glonoin does it contain?

One per cent.

What is the adult dose?

One minim.

Give therapeutic properties.

It is an antispasmodic and vasodilator.

How would you prepare the following prescription, and what necessary precaution would you take in compounding the same?

℞.	Scale pepsin	ʒ iii
	Pancreatin	ʒ iss
	Spirit glonoini	mxxiv
	Tincturæ nucis vomicæ	ʒ iv
	Ammonii chloridi	ʒ i
	Spirit Ammoniæ arom.	℥ i
	Aquæ dest.	ʒ vi
	Elixir calisayæ	q. s. ad. ℥ vi.

Mds.—A teaspoonful in water three times a day before eating.

Doctor F.....

Mix all the liquids except the water. Triturate the pepsin and water and add the other liquids. Then mix the pancreatin and ammonium chloride. The mixture should be dispensed with a "shake" label, as the alkaloids of the tincture of nux vomica would be precipitated, and the pepsin also, by the ammonium chloride.

Criticize the following prescription:

℞. Sodii salicylat.
Quininæ sulphatis ana .... gr. xx
Syrupi zingiberis .... ℥ ii.
Mds.—ʒ i ev. 3 hours.

A chemical reaction forms quinine salicylate and sodium sulphate. The quinine salt is only partly soluble in the syrup and the remainder precipitates. The dose of the sodium salicylate is too small to be effective, and when changed to sulphate defeats its object.

Criticize the following prescription:

℞. Tincturæ opii .... ʒ ii
Mistura cretæ .... q. s. ad..... ℥ ii.
Mds.—ʒ i after each bowel movement.

The prescription needs a "shake" label and is correctly written, but the directions are at fault, as it is dangerous to give that dose of the tincture of opium with such freedom. The prescriber has no idea of the quantity that may be taken. It had better be written "until effect desired."

In making a saturated aqueous solution of the following salts, how much of the salt is necessary to make one troy ounce of each by weight?

(1) Boric acid. (2) Carbolic acid. (3) Potassium chlorate. (4) Potassium iodide. (5) Sodium bromide.

Answer: (1) 26 grs. (2) 24 grs. (3) 28 grs. (4) 285 grs. (5) 180 grs.

State how much hydrochloride of Cocaine would be necessary to make one ounce troy (by weight) of the following aqueous percentage solutions of same.

(1) A 2% solution. (2) A 3% solution. (3) A 4% solution. (4) A 5% solution.

Answer: (1) 9.6 gr. (2) 14.4 gr. (3) 19.2 gr. (4) 24 gr.

How would you proceed to make an oleaginous solution of cocaine (castor oil)?

Powder the cocaine and triturate in a warm mortar with a small amount of the oil, and, lastly, add the remainder.

How much cocaine would be required to make a five per cent solution weighing one ounce troy?

24 grains.

Give the formula for making nitrohydrochloric acid.

One volume nitric acid and four and a half volumes hydrochloric acid, mix and stand in an open vessel until effervescence ceases.

Why is it frequently called aqua regia?

Because of its property of dissolving gold, the king of metals.

Why is it directed to be kept in glass-stoppered bottles and then only half filled?

It would decompose any other stopper and absorb moisture. If half filled, a certain amount of reaction may go on without danger from accumulated gases.

Give the formula for making the diluted nitrohydrochloric acid.

1 volume nitric acid, 4½ volumes hydrochloric acid, 19½ volumes distilled water. The pharmacopœia directs both acids to be mixed first before adding the water.

Why not add the nitric acid to the water and dilute the hydrocloric acid with the remainder, and then mix the two together?

There would be no chemical reaction if the acids were previously diluted, and hence no nitrohydrochloric acid formed. The product would be simply a mixture of diluted nitric acid and diluted hydrochloric acid.

What is the difference between an artificial and a natural emulsion?

The natural emulsion is found ready formed, while the artificial emulsion is manufactured.

Give an example of each.

Natural: Yelk of egg. Artificial: Emulsion of cod-liver oil.

How many emulsions are official?

Six.

How many of them are natural?

One.

How many are artificial?

Five.

What are oleates?

Liquids made by dissolving salts or alkaloids in oleic acid.

How many are official?

Five.

Name them.

Oleatum atropinae, oleatum cocainae, oleatum hydrargyri, oleatum quininae, oleatum veratrinae.

In what way do they differ from the corresponding ointments?

The ointment base is usually benzoinated lard, while the oleate base is oleic acid. The oleate is much stronger than the ointment, and may be used for making the ointment by dilution.

What precaution should be exercised in their application?

Do not use too much of the drug, as absorption differs in patients and may poison. Always watch effects of drugs.

In manufacturing fluidextracts of conium, nux vomica and sanguinaria why should a glass percolator be used?

The acetic acid used in the menstrua would act on a metal percolator and render the product valueless.

Why is ammonia used in the manufacture of fluidextract of licorice?

To extract the glycyrrhizin.

Why is solution of potassium hydroxide used in making fluidextract of senega?

To prevent precipitation of pectin which would gelatinize the preparation.

Give a reason for not making an infusion by diluting a fluidextract with water.

Water would precipitate the part of the drug extracted by the alcohol in the fluidextract menstruum, and the precipitate contains active matter.

State why infusions are generally incompatible with metallic and alkaloidal salts.

The acids of the drug, like tannic acid, would react with these substances, causing decomposition. Also the metallic salts would precipitate ingredients dissolved by the hot water.

In making solution of ammonium acetate it is directed that only translucent pieces of carbonate of ammonia be used. Why is this required?

If it is not translucent, it denotes the formation of bicarbonate from the action of moisture in air on the carbonate, and the preparation is then less active.

Give the reason why the solution of ammonium acetate should be made fresh when wanted.

Because the free carbonic acid present in the fresh solution is a desirable constituent and would not be present in the old preparation.

Why should the container be left unstoppered for a while after making it?

To allow excess of carbonic acid to escape.

Why does the solution of ammonium acetate produce precipitates with metallic and alkaloidal salts?

It is a feeble combination of acetic acid and ammonium, and readily decomposes, setting free acetic acid and ammonium hydroxide, which combines with the acid radical of the salts.

In making Basham's Mixture a precipitate is sometimes formed on adding the tincture of iron; what is the cause of this?

Because the acetic acid was not in excess and allowed the formation of hydroxide of iron instead of acetate.

What terms are used to describe the effect of exposure to the air on carbonate of soda and acetate of potash?

Deliquescence to acetate of potash, effervescence to carbonate of soda.

What is the difference between emulsification and saponification?

Emulsification is a physical change enveloping oils in solutions of gums whereby the oil disappears; while in saponification there is a chemical reaction in which the oil or fat unites with the alkali to form a soap.

What is the difference between distillation and sublimation?

Distillation is used in reference to liquids and sublimation in reference to solids, otherwise they are identical processes.

Give the ingredients of the following preparations:

(1) Tr. cinchona co. (2) Soap liniment. (3) Aromatic spirits of ammonia. (4) Tr. gambir comp. (5) Infusion of digitalis. (6) Fowler's Solution.

(1) Red cinchona, bitter orange peel, serpentaria, glycerin, alcohol, water.

(2) Soap, camphor, oil of rosemary, alcohol, water.

(3) Ammonium carbonate, ammonia water, oil lemon, oil lavender flowers, oil of myristica, alcohol, distilled water.

(4) Gambir, saigon cinnamon, diluted alcohol.

(5) Digitalis, cinnamon water, boiling water, cold water, alcohol.

(6) Arsenic trioxide, potassium bicarbonate, compound tr. lavender, distilled water.

What are the percentage strengths of the following:

(1) 4.5 grains to 1 fl. oz. (2) 9.6 grains to 1 oz. (3) 350 grains to 1 lb. avd.

Answer: (1) 1%. (2) 2%. (3) 5%.

How many minims would equal 100 drops of each of the following:

Water, tr. aconite, chloroform, tr. opium.

Answer: Water equals 100. Tr. aconite equals 40. Chloroform equals 24. Tr. opium equals 46.

How many grains of sulph. morphine in a 1-8 oz. bottle?

54.7 grains.

How are syrups of ipecac, rhubarb and squills prepared?

Syrup of ipecac is made by diluting fluidextract of ipecac with water and acetic acid. Allow to stand 24 hours and filter. Then add glycerin and sugar and strain.

Syrup of rhubarb is made by mixing fluidextract of rhubarb and spirit of cinnamon. Now add the potassium carbonate previously dissolved in the water, and, lastly, the syrup to make the desired quantity.

Syrup of squill is prepared by dissolving the sugar in vinegar of squill with a gentle heat, strain, and when cool, add water to make the desired quantity.

How is collodium prepared?

Add ether to pyroxylin and allow to stand fifteen minutes. Then add the alcohol and shake the bottle until the pyroxylin is dissolved. Set the bottle aside till clear and decant the clear portion, rejecting the sediment.

What are the three collodions prepared from it?

Collodium cantharidatum, collodium stypticum, collodium flexile.

Pepsinum: state its (a) official source, (b) solubility, (c) digestive powers.

(a) Fresh stomach of the hog.

(b) Soluble in fifty parts of water. More soluble if water is acidulated with hydrochloric acid. Insoluble in alcohol, ether, chloroform, but soluble in glycerin.

(c) Can digest three thousand times its weight of freshly coagulated and disintegrated egg albumen.

Pancreatin: State (a) its official source, (b) its solubility.

(a) Fresh pancreas of the hog or ox.

(b) Soluble in water slowly, but contains ten per cent substances insoluble in this medium. More soluble if alkaline. Insoluble in alcohol.

Spiritus ammoniae: State (a) its strength, (b) method of preparation.

(a) Ten per cent.

(b) Pour stronger ammonia water into a flask provided with a safety funnel and connected with a glass condenser with a well-cooled receiver containing alcohol. Heat the flask carefully and continue until ammonia gas ceases to be evolved. Then disconnect and assay the product, adding enough alcohol to make the product ten per cent by weight of ammonia gas.

Liquor calcis: (a) state common name, (b) substance in solution, (c) official method of maintaining strength.

(a) Lime water.

(b) Calcium hydroxide.

(c) The strength is maintained by keeping an excess of calcium hydroxide in the bottle, and decanting the clear liquid when required for use.

Mistura cretae: State (a) ingredients, (b) official directions to secure dispensing unfermented product.

(a) Compound chalk powder, cinnamon water, water.

(b) This preparation should be freshly made when wanted.

Compound the following:

℞.	Potassium iodide	Gr. xxx
	Sodium hyposulphite	Gr. iii
	Water, q. s.	
	Benzoinated lard	q. s. ʒ iv.
	Mix and make an ointment.	

Compound the following:

℞.	Hydrargyri iod. rub.		50 Gm.
	Amyli	4	00 Gm.
	Zinci oxidi	2	00 Gm.
	Misce. Sig.—Dusting powder.		

℞.	Chloroform	4	c.c.
	Exp. oil almonds	6	c.c.
	Tragacanth	1	5 Gm.
	Water	q. s. 100	c.c.
	Mix.		

This makes an emulsion of chloroform corresponding to U. S. P. except slight excess of tragacanth.

Define the term incompatible as applied in pharmacy. Name the different kinds of incompatibility and give an example of each.

Incompatibility is the term used to express the effects produced in pharmaceutical mixtures when two or more substances are mixed or combined, resulting either in a chemical reaction, physical difference, incomplete solution, or therapeutic opposition. There are three kinds, namely, chemical, physical, and therapeutic. *E. g.,*

Chemical—

℞.	Plumbi acetat.	ʒ ss
	Zinci sulphat.	Gr. xv
	Aq.	℥ iv.
	M.	

Physical—

℞.	Camphoræ	ʒss
	Menthol	ʒss
	Talcum	℥ii.

M. ft. Pulv.

Therapeutic—

℞.	Morph. sulph.	gr. ii
	Strychnin. sulph.	⅙ gr.

M. ft. cap. No. x.

Define (a) elutriation, (b) diluent, (c) fusion. Give an example of each.

(a) The process of obtaining a fine powder by suspending an insoluble powder in water and allowing the heavier particles to subside, and decanting the liquid containing the finer particles and allowing it to stand. Collect and dry the precipitate. Example, prepared chalk.

(b) The diluent is an inert powder added to a powder to increase its bulk, as sugar of milk added to calomel.

(c) Fusion is the process of liquefying solids, by the application of heat, without the use of a solvent. Example, melting wax.

Name three liniments containing camphor and three containing a volatile oil.

(a) Linimentum belladonnae, linimentum camphorae, linimentum saponis. (b) Linimentum saponis, linimentum saponis mollis, linimentum terebinthinae.

Name an official diluted acid, the strength of which is 2 per cent.

Acidum hydrocyanicum dilutum.

Give an official method for its preparation.

Mix diluted hydrochloric acid with distilled water, add silver cyanide, and shake in a glass-stoppered bottle. Allow the precipitate to subside and decant the clear liquid.

Name all the constituents in Lugol's Solution.

Iodine, potassium iodide, distilled water.

State in what essential particular it differs from Churchill's Tincture.

In that Churchill's Tincture contains alcohol as the solvent instead of water.

State how its decolorization may be accomplished.

By the addition of aqua ammonia or sodium hyposulphite.

Give a brief description of the process employed in detannating tincture of cinchona.

Prepare fresh ferric hydrate by adding ammonia water to solution of ferric sulphate. Wash well with water. Then drain off the wash water. Mix fluidextract of cinchona and alcohol and add this ferric hydrate. Agitate frequently until this tincture is deprived of tannic acid, ascertained by the absence of a black color on adding a few drops of tr. ferric chloride to a sample. Now pour the mixture into a percolator and add diluted alcohol to make 1000 C.c.

How does a medicated water differ from (a) a spirit, (b) a liquor?

(a) A spirit contains alcohol but the water does not.

(b) A liquor is a solution in water of a non-volatile substance while the water is a solution of a volatile substance.

Give two methods for preparing medicated waters.

Distillation and simple solution.

Name an excipient and diluent suitable for the manufacture of potassium permanganate pills.

Cacao butter and potter's clay.

What menstruum is used in preparing fluidextract of sarsaparilla, and in what proportion?

300 C.c. alcohol and 600 C.c. water.

Give the specific gravity of (a) alcohol, (b) glycerin, (c) mercury.

(a) equals .816. (b) equals 1.24. (c) equals 13.5.

Write a prescription in the metric system for a three ounce emulsion of ol. ricini.

℞. Oleum ricini		45	0
Acaciæ		12	0
Aquæ	q. s.	90	0

M. ft. Emulsio.

When oil of bitter almond contains a precipitate what is it? Give the cause.

It is cyanhydrin, caused by the union of benzaldehyde and hydrocyanic acid in old specimens.

Give method of preparing tincture of digitalis. Dose and percentage of drug it should contain.

Moisten the digitalis in No. 60 powder with diluted alcohol and place in a percolator without pressing. Allow it to stand six hours, then pack firmly, add menstruum to saturate the powder, and leave a layer above the powder. When the liquid begins to drop, close the lower orifice and macerate 24 hours. Cover the percolator closely. Then percolate slowly until 1000 C.c. are obtained. The dose is 15 minims, and it should contain 10% of the drug.

How much prepared chalk will be needed to prepare two ounces mistura cretae? What other ingredients enter into it?

182 grains. Cinnamon water, water, sugar, and acacia.

Classify the following fluidextracts with reference to the alcoholic strength of their menstrua?

(a) F. aconiti. (b) F. ipecac. (c) F. nucis vomicae. (d) F. scillae. (e) F. senegae.

Answer: (a, b, c) Alcohol three parts, water one part. (d) Acetic acid and water make the menstruum; no alcohol. (e) Alcohol two, water one.

What is calamine?

Impure zinc carbonate.

Name the ingredients and manner of preparation of each of the following well known preparations:

(1) Infusum digitalis. (2) Spiritus ammoniae aromaticus. (3) Mistura glycyrrhizae composita. (4) Tinctura gambir composita. (5) Unguentum aquae rosae.

Answer: (1) Digitalis, alcohol, cinnamon water, boiling water.

Pour boiling water on the digitalis in a suitable vessel and macerate one hour. Strain and add the alcohol and cinnamon water and enough cold water to make 1000 C.c.

(2) Ammonium carbonate, ammonia water, oil of lemon, oil of lavender flowers, oil of myristica, alcohol, distilled water.

Dissolve the ammonium carbonate in a mixture of distilled water and ammonia water by agitation. Allow to stand 12 hours and add gradually to the alcohol containing the oils and distilled water to make 1000 C.c. After 24 hours, filter.

(3) Pure extract of glycyrrhiza, syrup, acacia, camphorated tr. opium, wine of antimony, spt. of nitrous ether, water.

Rub the extract of glycyrrhiza and acacia in a mortar with water until dissolved and transfer to a graduated bottle containing the other ingredients. Rinse the mortar with water to make 1000 C.c.

(4) Gambir, saigon cinnamon, diluted alcohol.

Macerate the two drugs in a warm place in a stoppered container with diluted alcohol during 48 hours. Agitate frequently and filter. Add enough diluted alcohol on the residue in the filter to make 1000 C.c.

(5) Spermaceti, white wax, expressed oil almond, sodium borate, stronger rose water.

Reduce the white wax and spermaceti to fine shavings and melt at a moderate heat. Add the expressed oil of almond and continue heat until uniform. Then gradually add the stronger rose water previously warmed and in which sodium borate is dissolved, and stir rapidly and continuously until the mixture is congealed.

Emulsion: Copy the following formula, adding a proper quantity of each ingredient to make eight fluid-ounces of fifty per cent emulsion of codliver oil, each tablespoonful to contain four grains each of the salts mentioned: Also state how you would proceed to make the emulsion.

℞. Cod-liver oil.
Sugar.
Powd. acacia.
Calcium hypophosphite.
Sodium hypophosphite.
Oil of sassafras.
Oil of wintergreen.
Water.

Answer:

℞.	Ol. morrhuæ		℥iv
	Acaciae		℥i
	Sacchari		℥ss
	Calcii hypophos.		
	Sodii hypophos.	aa.	gr. lxiv
	Ol. sassafras.		
	Ol. gaultheriæ	aa.	gtt. xx
	Aquæ	q. s.	℥ viii.

M. Ft. Emulsio et Sig. f℥ss t. i. d.

Put the oil in a warmed mortar and add the acacia, when made uniform by trituration, add 2 oz. water all at once and stir rapidly until emulsified. The salts and sugar are previously dissolved in the water. Add the remaining water and stir until uniform. Lastly, stir the oils in gently so as not to emulsify them.

If moist opium containing 10 1-2 per cent morphine loses 30 per cent of its weight by drying what percentage of morphine will it contain when dry?

15%.

Give the adult dose of the following substances: (a) Fowler's Solution, (b) oil of savin, (c) santonin, (d) strychnine, (e) kino.

a) 2 to 5 minims. (b) 2 to 5 minims. (c) 1 to 4 grs. (d) $^1/_{60}$ gr. (e) 10 to 30 grs.

Name the ingredients and proportion of each used in preparing compound powder of jalap.

Powdered jalap, 35 parts; potassium bitartrate, 65 parts.

Tinctures: (a) Define the term, (b) name three processes by means of which tinctures are prepared, (c) give alkaloidal strength of tincture of nux vomica, (d) give strength of each of the following: Tincture of iodine, tincture of digitalis, tincture of opium, tincture of aconite:

(a) Tinctures are alcoholic solutions of medicinal substances.

(b) Percolation, simple solution, maceration.

(c) One-tenth per cent strychnine.

(d) Tincture of iodine, 7%; tincture of digitalis, 10%; tincture of opium, 10%; tincture of aconite, 10%.

State the difference between Labarraque's Solution and Javelle water. Which is official?

Labarraque's Solution is solution of chlorinated soda, while Javelle Water is solution of chlorinated potash. Labarraque's Solution is official.

Tincture of ferric chloride U. S. P. contains 13.6 per cent of anhydrous salt, and its specific gravity is .960. State: (a) how many troy ounces, eight fluid-ounces of the tincture would weigh, (b) how many drachms of anhydrous salt eight fluid-ounces of the tincture will contain.

(a) 7.2 troy ounces. (b) 7.93 drachms.

Give details of pharmacopoeial method of preparing deodorized tincture of opium. How many grains of morphine (maximum) are contained in fifty c.c. of this tincture?

(a) Pour boiling water on granulated opium and stir frequently during twenty-four hours. Put in a percolator and return the first percolate until it runs clear, and when it ceases to drop continue percolation with water until exhausted. Concentrate on a water-bath and mix with petroleum benzin by shaking for ten minutes. Separate this benzin and shake with another portion of benzin. Separate this benzin and drive off the remainder in a warm place spontaneously. Mix this liquid with water and filter, and add alcohol to the filtrate and enough water in the filter to make 1000 C.c.

(b) 9¼ grains of morphine.

Define (a) the term exsiccation, (b) name three official products obtained by the process, (c) how does it differ from desiccation?

(a) Exsiccation is the process of depriving a solid, crystalline substance of its water of crystallization or moisture by the use of strong heat.

(b) Dried ferrous sulphate, alumen exsiccatum, exsiccated sodium phosphate.

(c) In the amount of the heat applied, *e. g.*, desiccation is by low heat; also in the character of the substance; desiccation is mostly for vegetable drugs while exsiccation is for mineral drugs.

Name the official kinds of petrolatum.

Petrolatum, petrolatum album, petrolatum liquidum.

Criticize the following:

℞.	Hydrarg. protiodid.	ʒ ss
	Potassii iodidi	ʒ iss
	Tr. cinchonæ comp.	℥ i
	Syr. sarsaparillæ comp.	℥ iii.
	M. et Sig. ʒ i t. i. d.	

The protiodide of mercury is changed to biniodide by the potassium iodide. The alkaloids in the tr. cinchona comp. are precipitated as insoluble iodides, due to the action of the potassium iodide. It would be better to give the hydrarg. protiodide in pill form and fill the rest of the prescription as written. The dose of the protiodide is rather excessive in most cases.

Why does the pharmacopoeia direct the use of the expressed oil of almond in preparing emulsion of chloroform?

To give body to the emulsion so that the chloroform will be held in suspension, and therefore not dissipate itself in the air.

You have 200 C.c. of official stronger water of ammonia, Sp. Gr. 0.897; state (a) how many grammes of official water of ammonia this will yield upon proper dilution; (b) how many grammes of water are required for dilution.

(a) 432.3 gm. (b) 322.9 gm.

Translate the following into English:

(a) Ejusdem. (b) Ad libitum. (c) Cochleare parvum. (d) Charta cerata.

(a) Of the same. (b) At pleasure. (c) A teaspoonful. (d) Waxed paper.

For interpretation, comment and criticism:

No. 1. ℞.	Potassii iodidi	ʒi
	Tr. ferri chloridi	ʒiv
	Aquæ q. s. ad.	℥iv.

M. ft. Mist. S.—ʒi ev. 2 hr.

No. 2. ℞.	Argenti nitratis	gr. ii
	Cocainæ hydrochlor.	gr. xx
	Aquæ destillatæ	℥ii.

Misce. Sig.—External use as dir.

No. 3. ℞.	Strych. sulph.	gr. ss
	Quin. sulph.	gr. ii.
	Ext. taraxaci, q. s.	

M. Ft. Pill D, td. No. xxiv.

(a) State approximately the quantity of extract you would employ.

No. 4. ℞.	Plumbi acetatis	ʒi
	Tincturae opii	℥ss
	Glycerini	℥i
	Aquæ	℥vii.

Misce. Sig.—External use.

No. 5.	℞.	Tr. ferri chloridi	ʒ iii
		Tr. guaiaci ammoniat	ʒ iv
		Tr. aloes	ʒ iv
		Syrupi	q. s. ad. ℥ iv.

M. S.—ʒ i tid.

No. 6.	℞.	Antipyrin	ʒ i
		Tr. aconiti	ʒ iv
		Spt. aeth. nit.	℥ ss
		Aq.	q. s. ad. ℥ iii.

M. Sig.—ʒ ii ev. 3 hr.

No. 1. This might be more palatable if glycerin or syrup were added. The 2 gr. dose of potassium iodide would act better if increased to 5 grs. and less frequent dosage.

No. 2. The silver nitrate reacts with the cocaine hydrochloride and precipitates as the useless chloride.

No. 3. (a) Use 20 grains ext. taraxacum. D. t. d. Translated means: Let such doses be given. The dose intended is most indefinite. If it is to be made into 24 pills and one taken, the quinine sulph. is in too small a dose to be effective. If it is intended that each pill contain that amount of strychnine, that dose is too large.

No. 4. The lactic and meconic acids in tr. opii cause a precipitation of the lead salt, and the prescription should be dispensed with a "shake" label. The plumbi acetatis should be dissolved in the water first, then mixed with glycerin and added to the tr. opii.

No. 5. The tr. iron here causes a blue color with the tr. guaiac. Unsightly combination.

No. 6. In this prescription the antipyrin causes a green color to appear. The dose of tr. of aconite is fatal, and even if reduced to right size is too long between doses to get a continued effect.

Formaldehyde: In what form is this official in the 8th revision of the U. S. P.?

As an aqueous solution.

How much absolute formaldehyde by weight is it required to contain?

37 per cent.

What is it the product of?

The vapor of boiling methyl alcohol is mixed with air under pressure.

Describe it.

A clear, colorless liquid, irritating when smelled, caustic taste, neutral reaction.

What are its medicinal properties and uses?

Antiseptic, antiferment, and disinfectant. Never used internally.

What is it often used for unlawfully?

As a preservative of milk and other food products.

Mention the best known antidote for its poisonous effects.

Solution of ammonium acetate internally. Inhalation of ammonia.

Give the official Latin name for chlorinated lime (so-called chloride of lime).

Calx chlorinata.

How is it prepared?

By exposing powdered calcium hydroxide to chlorine gas.

What is it used for?

As a disinfectant and externally on ulcers and in skin diseases.

What gaseous element does it contain?

Chlorine.

What percentage of this gas should be available?

30 per cent.

Give the Latin and common name of the official preparation made from it.

Liquor sodae chlorinatae—Labarraque's Solution.

Give the official Latin name for calcium chloride.

Calcii chloridum.

Give its chemical formula.

$CaCl_2$.

How may it be prepared?

By the action of hydrochloric acid on calcium carbonate, evaporating to dryness and heating to redness.

How much would you charge for this prescription:

℞. Lanolin.
Ichthyol ....ana. ℥i.
Ft. ungt. Sig.—Apply frequently.

75 cents.

If lanolin costs 75 cents per pound avoirdupois how much will a troy ounce cost?

$5\frac{1}{7}$ cents.

If ichthyol costs $4.50 a pound avoirdupois, what will a troy ounce cost?

$.30\frac{6}{7}$ cents.

Spiritus aetheris nitrosi. What is it as defined by the U. S. P. Eighth Revision?

An alcoholic solution of ethyl nitrite, yielding, when freshly prepared and tested by the official process, not less than 4% of ethyl nitrite.

What should be its strength when freshly prepared; how should it be kept?

Four per cent ethyl nitrite. Keep in small, well-stoppered, amber-colored bottles, in a cool place, remote from lights and fire.

Why is the monohydrated sodium carbonate used in the process of manufacture?

To remove traces of acid.

Describe it and give its medicinal properties and uses.

It is a clear, mobile and inflammable liquid of a pale yellow color, a fragrant ethereal odor, and sharp, burning taste. Neutral to litmus paper. It is a diaphoretic, refrigerant and diuretic, and is used in inflammatory diseases, fevers, acute nephritis, and cystitis.

What is the specific gravity of the official preparation?

0.823.

At what temperature is it directed to be taken?

25 degrees C.

What was its specific gravity according to U. S. P. 1890 and at what temperature, and why was this important change made in the 8th revision?

0.836 to 0.842 at 15 degrees C. These figures were found too high, and 0.820 was nearer the true specific gravity if U. S. P. deodorized alcohol (0.816) be used for dilution.

Into what preparation does extractum glycyrrhizae purum enter?

Mistura glycyrrhizae composita.

Give the U. S. P. Latin name for Brown mixture.

Mistura glycyrrhizae composita.

Name all the ingredients of the 8th revision process for preparing it.

Pure extract of licorice, syrup, acacia, camphorated tincture of opium, wine of antimony, spirit of nitrous ether, water.

What is antimony?

An elementary metal, brittle and brilliant, and if rubbed between the fingers produces an odor.

Give the Latin name of tartrated antimony.

Antimonii et potassii tartras.

Give its medicinal properties and dose.

It is emetic in ½ to 1 gr. dose. Alterative, diaphoretic in $^1/_{20}$ gr. doses, and expectorant in $^1/_{40}$ gr. doses.

Into what preparations does it enter?

Vinum antimonii.

What is naphthalenum?

A hydrocarbon obtained from coal-tar and purified by crystallization.

From what is it obtained?

Coal-tar.

Briefly describe it.

Colorless, shiny, transparent laminae, volatile in air and becoming dark in light, burning taste, strong tar-like odor.

Give its chemical formula.

($C_{10}H_8$).

Give its medical properties and dose.

Insecticide and antiseptic. In summer diarrhœa, ⅙ gr. to children, 5 gr. to adults.

Suppose you receive a prescription calling for 240 grains of natural sodium salicylate to be dissolved in three ounces of peppermint water, but find that you do not have that kind of sodium salicylate in stock, but have plenty of salicylic acid made from oil of wintergreen; on referring to a saturation table in the appendix to the Pharmacopoeia you find that 100 grains of the acid are neutralized by 61.77 grains of sodium bicarbonate and will yield 115.98 grains of sodium salicylate. Having ascertained these facts, write out a prescription giving the exact quantity in grains

of sodium bicarbonate and salicylic acid to conform to the above-mentioned prescription.

℞.	Ac. salicylic	206.6 grs.
	Sodii bicarbonatis	127.5 grs.

What is glycyrrhiza?

The dried rhizome and roots of glycyrrhiza glabra.

Briefly describe it.

It occurs in cylindrical pieces 8 inches by ¼ inch thick, wrinkled longitudinally, dark brown and friable, yellow internally, sweet taste and but slight odor.

Into what official preparations does it enter?

Extractum glycyrrhizae, extractum glycyrrhizae purum, pulvis glycyrrhizae compositus, fluidextractum glycyrrhizae.

Give its medical properties.

It is used solely because of its sweet and agreeable taste to mask the taste of nauseating drugs.

Describe glycyrrhizinum ammoniatum.

Dark brown scales, without odor but very sweet taste, soluble in water and alcohol.

How is extractum glycyrrhizae purum made?

By percolating glycyrrhiza with dilute ammonia water, evaporating to a pilular consistence, and incorporating 5% of glycerin.

Give test for the absence of mercurous oxide in mass of mercury.

If a portion of the mass be triturated in a mortar with warm acetic acid, the filtrate should not become more than slightly opalescent on the addition of a few drops of hydrochloric acid.

Give test for absence of mercuric oxide.

If a portion of the mass be digested with warm diluted hydrochloric acid and a little purified animal charcoal, the filtrate should not be affected by hydrogen sulphide test solution or by stannous chloride t. s.

What are its medical properties and dose?

Its dose is 4 grs. as an alterative and purgative.

What is chloroform?

A liquid consisting of 99% of absolute chloroform and 1% of alcohol.

Give its specific gravity.

1.476.

Is it inflammable?

No.

How is it made?

By the action of chlorinated lime on acetone.

What is spirit of chloroform?

A 10% alcoholic solution.

How is chloroform water made?

By shaking distilled water and chloroform, allowing the precipitated chloroform to remain in excess and decanting when wanted.

How is chloroform liniment made?

By mixing 300 C.c. of chloroform with 700 C.c. soap liniment.

Give medicinal properties and use of chloroform.

It is anæsthetic by inhalation, narcotic internally, carminative and sedative in small doses. It blisters when applied to the skin.

Give the maximum dose for internal use.

Two fluid drachms well diluted.

What is the best method for reducing asafoetida to a fine powder?

Dry the drug first, then powder.

How would you reduce colchicum seed to a fine powder? with mortar and pestle?

Use an iron mortar and pestle and pound hard.

Why should tablets and powders containing camphor be kept in a cool place?

Because camphor sublimates with heat and would thus be lost.

Copy the following formula, changing grammes and cubic centimeters into ounces, grains and minims; also state how you would make the mass and what necessary precaution you would take in its manufacture.

℞.	Potassium chlorate in fine powder	30.
	Sugar in fine powder	120.
	Tragacanth in fine powder	6.
	Spirit of lemon	1.

Water q. s. to make mass and divide into 100 troches.

℞.	Potassium chlorate in fine powder	462 grains
	Sugar in fine powder	℥iii ʒvi gr. xlviii
	Tragacanth in fine powder	Grs xcii $\frac{4}{10}$
	Spirit of lemon	16 minims.

Water q. s. to make mass and divide into 100 troches.

Rub with a spatula until all the powders are intimately mixed, being careful not to use force or pressure, to avoid explosion of the potassium chlorate. Lastly, mix the oil and sufficient water to make a thick mass. Then cut into 100 even pieces with a troche-cutter and dry.

Give the quantity of each ingredient represented in each pill when made after the following formula; also state how you would prepare the mass and in what order you would add the ingredients.

℞.	Ext. nucis vomicae	gr. iv
	Ferri sulph.	gr. xxxii
	Potassii carb.	gr. xvi
	Sacch. alb.	gr. viii
	Pulv. tragacanth	gr. ii
	Pulv. althea	gr. ii.

Glycerin, aqua, ana q. s. fiat mass. Divide in pilulæ No. xvi.

Ext. nucis vomicae, 1/4 gr.; ferri sulp., 2 gr.; potassii carb., 1 gr.; sacchar. alb., 1/2 gr.; and 1/8 gr. each of althea and tragacanth. Rub the pot. carb. in a mortar with a few drops of glycerin and water, then add the ext. nucis vomicae, ferrous sulphate and sugar previously triturated together to a uniform powder, and rub the mass thoroughly until it assumes a greenish color. Then incorporate the tragacanth and althea and make a pill mass, adding water if necessary. Then divide into 16 pills.

Criticize the following prescription and state what you would do if presented to you for compounding.

℞. Quininæ sulph.
Ferri reduct.
Acid arsenosum.
Ext. gentianæ ....ana. gr. xii.
Fiat mass dividæ in capsulas No. xii.
Sig.—One ev. 3 hr.

The dose of arsenous acid is too large. If unable to reach the prescriber it would be proper to use 1/4 gr. of arsenious acid instead of 12 grs. The ingredients should be intimately mixed in a mortar and water added so as to form a pill mass, and divide into 12 parts and place in capsules.

What are alkaloids?

Highly active (physiologically) bodies obtained from both the animal and vegetable kingdoms. They are mostly crystallizable and colorless, and represent in most cases the activity of the plant drugs.

What are alkalies?

Substances which unite with acids forming salts. They turn red litmus blue.

What are acids?

Chemical compounds in which hydrogen is linked to a negative element by means of oxygen.

What are acid salts?

Those salts in which part of the acid radical has been replaced by the alkali or base.

What are basic salts?

Salts in which the hydrogen of the base is not completely replaced by the acid.

What is a saturated solution?

A solution in which the solvent has dissolved all the salt capable.

What is a supersaturated solution?

One in which by increasing the temperature more of the substance is dissolved than would occur at normal temperature.

Name the official solutions.

Liquor acidi arsenosi, liquor antisepticus, liquor arseni et hydrargyri iodidi, liquor calcis, liquor iodi compositus, liquor plumbi subacetatis, liquor ammonii acetatis, liquor potassii hydroxidi, liquor sodii hydroxidi, liquor sodii arsenatis, liquor chlori compositus, liquor creosolis compositus, liquor ferri chloridi, liquor ferri subsulphatis, liquor ferri tersulphatis, liquor ferri et ammonii acetatis, liquor formaldehydi, liquor hydrargyri nitratis, liquor magnesii citratis, liquor plumbi subacetatis, liquor potassii arsenitis, liquor potassii citratis, liquor sodae chlorinatae, liquor sodii phosphatis compositus, liquor zinci chloridi.

Salicylic acid: How does it exist naturally and from what natural products may it be obtained?

In combination as methyl salicylate in oil of wintergreen. It may be obtained from oil of birch or oil of wintergreen.

From what is it obtained synthetically?

The action of carbon dioxide on sodium phenol.

Describe it and give its medical properties and uses, also give its dose.

Light, fine, white needles, or a bulky white powder, permanent in air, odorless or a faint gaultheria odor, taste sweet, reaction acid. It is an antipyretic, anti-rheumatic, and escharotic externally. It is used in fevers, acute rheumatic especially, for intestinal antisepsis, and on corns and warts. Its dose is 8 grs.

If salicylic acid costs 48 cents per pound and sodium bicarbonate 5 cents per pound, and the market price of sodium salicylate is fifty cents per pound, will it profit you to make your own sodium salicylate, especially when you remember that much of it is used and dispensed as a 50 per cent solution, thus saving time of drying and powdering the entire product; the following quantities will yield one pound of the finished product or two pounds of 50 per cent solution. Salicylic acid 11 ounces and 2 drachms; sodium bicarbonate 6 ounces and 6 drachms; water q. s.; what will be the cost of your product as compared with the market price, and what will be your profit?

There is a profit of 13 cents a pound. Cost to make 37 cents against market cost of 50 cents.

How would you detect the presence of salicylic acid in suspected fruit, syrups and juices?

Ferric chloride test solution colors the sample a bluish violet-red if salicylic acid is present.

What per cent of metal does massa hydrargyri contain?

33 per cent.

Give the common names for this preparation.

Mass of mercury, blue mass, coerulean mass, pill hydrargyri.

Why is long-continued trituration necessary?

To extinguish the metal.

Aromatic or medicated waters: In the new Pharmacopoeia (the 8th revision) eighteen medicated waters or solutions are given; some are made by distillation; some by trituration; some by solution, and others by aeration. Give the names of those made by distillation.

Aqua aurantii florum fortior, aqua aurantii florum, aqua destillata, aqua hamamelidis, aqua rosae fortior, aqua rosae.

In making distilled water it is directed that 1000 volumes of water be used and only 800 volumes of the distillate retained for use, the first and last 100 volumes being rejected; give the reason for this.

The first 100 volumes contains the gaseous impurities and the latter 100 volumes contains metallic impurities.

Name those made by trituration.

Aqua anisi, aqua camphorae, aqua cinnamomi, aqua fœniculi, aqua menthae piperitae, aqua menthae viridis.

What substance or triturant is used to diffuse the oils through water?

Purified talc.

What triturant was used according to the Pharmacopoeia of 1890 and why was this change made?

Precipitated calcium phosphate. It was omitted because of its slight solubility, which caused a reaction with certain chemical substances.

Mention those waters made by solution and state how this is effected.

Aqua amygdalae amarae, aqua chloroformi, aqua creosoti. The first and third are made by shaking the medicinal ingredient in water and then filtering. Aqua chloroformi is made by adding an excess of chloroform to water, and shaking. When wanted, simply decant the solution.

Mention those official gaseous solutions made by aeration and classed as waters.

Aqua ammoniae, aqua ammoniae fortior, aqua hydrogenii dioxidi.

Are the medicated waters in the various processes above mentioned made with distilled or common water?

With the exception of aqua hamamelidis, all are made with distilled water.

How would you prepare the following prescription, and give the reason for your method?

℞.	Adeps lanæ	ʒ vi
	Aqua	ʒ i
	Sodii salicylas	ʒ i
	Methyl salicylas	ʒ i
	Menthol	gr. xv.

Ft. Ung. S.—Local use.

As the menthol is soluble in the methyl salicylate, I would mix the two and incorporate with the adeps lanae. The sodium salicylate might be rubbed in this mixture, but would make a more uniform product if it were previously dissolved in the water. Therefore I would dissolve it in water and incorporate it with the first mixture.

℞. Solut. phenolis, 10 % .... ℥ viii.

How would you prepare the above and why?

Take 4 oz. glyceritum phenolis and add to 4 oz. of water, because phenol is not soluble in water to the extent of 10%, and no restriction is placed on the solvent.

What percentage of phenol is soluble in water?

Five per cent.

What will increase the solubility of phenol in water?

The addition of glycerin.

What percentage is soluble in alcohol?

Very soluble.

What is the approximate equivalents in the apothecaries' and metric system?

(1) Teacup. (2) Wineglass. (3) Tablespoonful. (4) Dessertspoonful. (5) Teaspoonful.

(1) equals f℥iv .... 120 C.c.
(2) equals f℥ii .... 60 C.c.
(3) equals fʒiv .... 16 C.c.
(4) equals fʒii .... 8 C.c.
(5) equals fʒi .... 4 C.c.

Write this prescription using avoirdupois instead of metric to express the amount of ingredients; also state how you would prepare this ointment so that all of the resorcin prescribed shall remain incorporated; state how much you would charge for a prescription like this.

℞. Resorcinum .... 10.
Adeps Lanæ, U. S. .... 30.
M. ft. Ungt. Sig.—Use externally. Dr. P.

℞. Resorcini .... gr. cliv ½
Adipis lanæ, U. S. .... 1 oz. gr. xxiv ½.
M. ft. Ungt. et Sig.—Externally.

By adding one drachm of water the resorcin will remain incorporated. It is worth 30 cents.

State how you would compound this prescription and what necessary precaution you would exercise.

℞. Ammonii carbonat .... ʒi
Syrupus scillæ.
Syrupus senegæ .... ana. fʒiv
Aqua fœniculi .... q. s. ad. f℥ii.
M. Sig.—1 ʒ ev. 3 hr. Dr. E.

Powder the ammonium carbonate and add the syrupus scillae. When effervescence ceases add the other ingredients. It is important to be sure reaction is complete before handing to customer, as accumulation of carbonic acid gas might explode the bottle.

Criticize the following prescription and state what difficulties you meet in compounding same.

℞.	Morphinæ sulph.	gr. xii
	Potassii bromid	gr. cxx
	Spirit ammonia arom.	fʒ iv
	Aqua distil. q. s. ad.	f℥ iii.

M. et Sig.—1 ʒ ev. 3 hr. Dr. A.

The dose of morphine is ½ gr., and that is rather large. The alkalinity of the spt. ammonia arom. is sufficient to decompose the morphine sulph. Also the potass. bromid. would precipitate it as the insoluble bromide. It should not be filled as written without consulting the writer.

What is a cerate?

An ointment-like substance of such consistence that it may be spread on muslin, yet not fluid enough to run when applied to skin.

Why are they called cerates?

Because they contain wax, the Latin name for which is cera.

Give the number of official cerates; also an example of one or more made by fusion, and one or more made by incorporation.

Six are official. By fusion—Camphor cerate, resin cerate. By incorporation—Cerate of subacetate of lead.

What are ointments and how do they differ from cerates?

Ointments are fatty preparations for application to the skin by inunction, but softer than cerates.

How many are official, and how would you make ointment of zinc oxide in order to insure a perfectly smooth white ointment?

Twenty-four are official. Rub the oxide of zinc to a smooth paste with the melted benzoinated lard, gradually added, and triturate until cold.

Why is soap liniment set aside for 24 hours after being made, before it is filtered?

To allow precipitation of inert and insoluble matter.

The following Latin abbreviations are frequently used in writing prescriptions. Write them out in full and translate them into English. (1) Aq. bull., (2) Aq. ferv., (3) Aq. pluv., (4) Ft. Collyr., (5) Ft. pil., (6) Ft. Mas. div. in pill XII, (7) Mic. pan., (8) Omni Hor., (9) Sec. Art., (10) Ter. bene.

(1) Aqua bulliens, as boiling water. (2) Aqua fervens, hot water. (3) Aqua pluvialis, rain water. (4) Fiat collyrium, make an eye-wash. (5) Fiat pilulas, make pills. (6) Fiat massa et divide in pilulas XII, make a mass and divide into twelve pills. (7) Mica panis, bread crumbs. (8) Omni hora, every hour. (9) Secundem artem, according to art. (10) Tere bene, rub well.

Seidlitz powders. (1) Give the Latin and American official name for same. (2) The following is the official formula:

Sodium bicarbonate in fine powder	31 gm.
Potassium and sodium tartrate fine powder	93 gm.
Tartaric acid in fine powder	27 gm.

Mix the first two powders intimately and divide into twelve equal parts, enclosing each part in blue paper. Divide the tartaric acid into twelve equal parts and enclose each part in a white paper. Reduce the metric weights or quantities above given to avoirdupois weight. If sodium bicarbonate costs 5 cents a pound, potassium and sodium tartrate costs 25 cents a pound and tartaric acid 36 cents a pound, what will a box of seidlitz powders holding a dozen blue and white powders each, cost, counting five cents for box, label, and wrapper?

(1) Pulvis effervescens compositus — Compound effervescing powder.

(2) Sod. bicarb., 1 oz. 40 grs.; pot. et sod. tart., 3 oz. 2 drams; ac. tartaric, 6 drams 56 grains. Cost per box, 13 cents.

What chemical reaction takes place when the contents of a blue and white paper, previously dissolved in water, are mixed together?

Tartaric acid forms sodium tartrate with the sodium bicarbonate.

Does this reaction improve the character and efficiency of the solution or not?

It does.

What are the medicinal properties of Seidlitz powders?

Laxative and refrigerant.

How many grains in an avoirdupois pound?

7000.

How many in a troy pound?

5760 grs.

How many in an avoirdupois ounce?

437.5 grains.

Many drugs like phenacetin, sulfonal, aristol, antikamnia, antipyrine, and trional are sold in small containers holding one avoirdupois ounce of the drug. If one ounce (avoirdupois) of phenacetin costs one dollar and you sell it at the rate of 60 grains for 20 cents, what will be your profit on the ounce?

Answer. About 45 cents profit.

If you purchase one ounce of sulfonal for $1.40 and you sell it at the rate of 60 grains for 25 cents what will be your profit?

Answer. 42 cents.

Magnesium: Describe it, give its symbol and atomic weight.

It is a silvery-white, metallic body, which burns with a white light when heated to redness. Symbol is Mg.; atomic weight, 24.18.

When it is heated to redness in the flame of an alcohol lamp, what takes place and what is the product of combustion?

It burns and forms the oxide of magnesium.

What is magnesium chiefly used for?

Its principal uses are in photography and pyrotechny.

Name the four official compounds of magnesium.

Magnesium carbonate, oxide, citrate, sulphate.

Name the two pharmaceutical preparations of the carbonate.

Magnesium oxide and citrate.

Give the formula for solution of magnesium citrate.

Magnesium carbonate, citric acid, water, potassium bicarbonate, syr. citric acid.

If citric acid is worth 40 cents per pound? Mag. carb 24 cents per pound, potas. bicarb. 16 cents per pound, and syrup of citric acid 20 cents a pint, bottle and label five cents, what will one bottle of the solution of magnesium citrate cost you? What is your selling price and profit.

Cost about 12 cents per bottle. Sells at 25 cents. Profit 13 cents.

What acid is obtained from argols?

Tartaric acid.

Give chemical properties of this acid.

Tartaric acid exists in four isomeric varieties. It reduces an ammoniacal solution. It carbonizes when strongly heated.

Give the official method of making distilled water.

Distil water and reject the first 100 volumes, and reserve the next 800 volumes.

How would you detect the presence of (1) lead, (2) copper, (3) calcium, (4) sulphates, (5) chlorides, (6) ammonium sulphate, (7) free ammonia, (8) albuminoid ammonia, (9) organic matter?

(1) Hydrogen sulphide t. s. produces a pale brown discoloration.

(2) Hydrogen sulphide t. s. yields a pale brown discoloration, and when precipitated is soluble in warm nitric acid.

(3) Ammonium oxalate precipitates calcium.

(4) Barium chloride precipitates sulphates.

(5) Silver nitrate precipitates chlorides.

(6) Barium chloride precipitates ammonium sulphate.

(7) Nessler's reagent will show a yellow tint if free ammonia is present.

(8) Diluted sulphuric acid added to a boiling sample, to which is added potassium permanganate v. s., the pink color should not be completely destroyed in ten minutes' boiling.

(9) As in number 8.

If you pay $1.40 an ounce (avoirdupois) for a drug, how much will one dram (troy) cost?

19⅕ cents.

How much will a troy ounce cost?

$1.536.

If 8 fluid ounces of ess. pepsin costs 67 cents what will three fluid ounces cost?

25⅛ cents.

What will you charge for the three ounces if you wish to gain 100 per cent profit.

50¼ cents.

What is calcium oxide commonly called?

Lime.

What is lime water?

An aqueous, saturated solution of calcium hydroxide.

Give its official Latin and English name.

Liquor calcis—Solution of lime.

How is it made?

By dissolving lime in water.

Give its strength at 15° C.

0.14%.

What happens when carbon dioxide is led into it in small quantities?

Precipitation of calcium carbonate.

Give its medical properties and dose.

Antacid, antiemetic, and externally as a sedative in lotions. Dose, one ounce.

Give name and synonym of the official preparation of lime water.

Linimentum calcis or carron oil.

What is argol?

Impure cream of tartar.

From what is it obtained?

The juice of grapes in the wine vats after standing.

How is it purified?

By repeated crystallization.

Give official name of the purified product.

Potassii bitartras.

Give limit of the natural impurity and test for the purified product.

One per cent limit. With sodium—cobaltic nitrite t. s. the aqueous sol. yields a copious yellow precipitate.

Into what official powder does it enter?

Pulvis jalapae compositus.

Give official name of a commonly used double salt made from it?

Potassii et sodii tartras.

Give dose and medical properties of this salt.

Dose, one ounce as a cathartic. It is diuretic and refrigerant.

What is betanaphthol?

A mon-atomic phenol obtained from naphthalenum.

How is it prepared?

Naphthalene is digested with fuming sulphuric acid, and the betanaphthalene sulphuric acid formed is fused with an alkaline hydroxide, then hydrochloric acid is added and betanaphthol is liberated.

Briefly describe it.

Pale, buff-colored, shiny plates, permanent in the air, faint phenol-like odor and sharp pungent taste.

Give its chemical formula and test for presence of naphthalene.

$C_{10}H_7OH$. It should dissolve in fifty parts ammonia water without residue.

What are its medical properties and dose.

Antiseptic in skin diseases. It may be used in 3 gr. doses internally.

What is nux vomica?

The dried, ripe seed of strychnos nux vomica.

Where does the plant grow?

In the East Indies.

Name the principal constituents of the drug.

Strychnine, brucine, igasuric acid and gum, and fixed oil.

Briefly describe the process for making fluidextract of nux vomica.

Made by exhausting 1000 gm. of the powdered drug with a 5% acetic acid menstruum in alcohol and water, reserving the first 900 C.c. and evaporating the remainder to a soft extract. Dissolve this in the reserve portion and mix thoroughly.

What percentage of alkaloids should the fluid extract contain?

One per cent.

How is calcium oxide prepared?

By calcining white marble.

Give its official Latin name.

Calx.

Name some drugs which may be more advantageously purchased by having a perfect knowledge of the various pharmacopoeial tests.

Liquor ferri chloridi, aqua ammoniæ, alcohol, olive oil, copaiba.

What penalties do the pharmacy laws impose upon those found guilty of selling or offering for sale adulterated drugs and medicine?

Usually a money fine or imprisonment, or both.

Should a druggist or shop-keeper of any kind make tincture of iodine containing less than 7 per cent of iodine or use wood alcohol, or Columbian spirits instead of ethyl alcohol and label it iodine or imperial iodine, or make essence of peppermint, containing less than 10 per cent of the oil and label it peppermint or American peppermint, or make tincture of ginger with less than 20 per cent of the root, possibly adding capsicum and grains of paradise and reduce the alcoholic strength prescribed by the U. S. P., and label it ginger, or imperial ginger and offer it for sale;

would the names used protect him against the operations and penalties of the above adulteration act?

No.

Describe the following drugs as to their physical appearance, color, odor and taste. (1) Nitromuriatic acid, (2) Diluted nitromuriatic acid, (3) Fuming nitric acid, (4) Hydrochloric acid. C. P., (5) Iron sulphate, (6) Litharge, (7) Iodoform, (8) Copper sulphate.

(1) Golden-yellow, fuming, corrosive liquid, smelling of chlorine, taste strongly acid.

(2) A colorless, aqueous liquid, very acid taste, slight odor of chlorine.

(3) A heavy, red, fuming, corrosive liquid, suffocating odor, caustic, burning taste.

(4) A colorless, fuming liquid, pungent odor, very acid taste.

(5) Large, pale bluish-green prisms, odorless, styptic taste, effloresces in the air.

(6) A heavy, reddish-yellow powder, odorless and tasteless, insoluble in water.

(7) A fine, lemon-yellow powder, peculiar persistent odor, unpleasant, slightly sweet taste, neutral reaction.

(8) Large, transparent, deep blue crystals, effloresces in the air, odorless, metallic taste, somewhat nauseating.

How would you obtain the specific gravity of liquids?

Weigh the liquid in a specific-gravity bottle that holds 1000 grains of water. Point off three places and the result is its specific gravity.

If 1000 grains of distilled water at a temperature of 60° F. just fills a bottle, what is its specific gravity?

1.000 specific gravity.

If the same bottle be filled with ether U. S. P. at the same temperature, what will it weigh and what will be its specific gravity?

Weight, 716 grains. Specific gravity, .716.

If the same bottle be filled with chloroform U. S. P. at the same temperature, what will it weigh and what will be its specific gravity?

Weight, 1476 grains. Specific gravity, 1.476.

What will mercury weigh and what will be its specific gravity if the same bottle be filled?

Weight, 13535 grains. Specific gravity, 13.535.

Describe briefly the manufacture of oil of turpentine and give the official Latin names of the two oils recognized by the U. S. P.

A mixture of turpentine and water is placed in a copper retort and heat applied till the oil has completely distilled. It is condensed and collected in a suitable container.

Oleum terebinthinae, oleum terebinthinae rectificatum.

To what class of drugs does the substance yielding the oil of turpentine belong? Give its common commercial name.

It is an oleoresin. Its name is turpentine, or gum turpentine.

What important official substance remains as a byproduct after the oil is obtained?

Rosin (resina).

Which of the two oils should be dispensed when ordered by a physician's prescription?

The rectified.

Why does the U. S. P. provide tests for the identification and purity of drugs?

To insure uniformity of the drug and guard against fraud. It also denotes the amount of allowable foreign bodies which are difficult of removal.

Why do some precipitates rise to the surface? Give an instance.

Because they are lighter than the liquid; for example, pepsin.

What effect does heat and cold have when applied to the manufacture of precipitates in general?

Heat produces heavy, and cold, light precipitates.

How are light and heavy carbonate of magnesia made?

Magnesium sulphate is precipitated by sodium carbonate, and the light is formed by using a large amount of cold water. The heavy forms from hot, dense solutions.

Syrup of strawberries: Ripe strawberries with stems removed and washed, six quarts; granulated sugar, 12 pounds. Place a layer of berries in a clean porcelain-lined kettle, cover with a layer of sugar, and repeat with alternate layers of berries and sugar until all are disposed of; allow them to stand for six or eight hours, until the sugar is practically dissolved in the juice of the berries; then strain and boil; strain into bottles or jugs while still hot. So called concentrated fruit syrups are usually sold at $2.00 per gallon. How much syrup will the above formula yield, and what will it cost per gallon if the sugar shall cost 6 cents per pound and the berries 8 cents per quart.

Cost $1.50 and yield about twelve pints.

What is meant by the term specific gravity as applied to chemistry and pharmacy?

It is the relative weight compared with an equal volume of water.

What is the standard for comparison with other substances, such as liquids and solids, whose specific gravity we desire to obtain?

An equal bulk of pure water expressed as 1 at a given temperature and atmospheric pressure.

How would you obtain the specific gravity of a solid heavier that the standard just mentioned or implied.

Weigh the body in air, then weigh it suspended in water if insoluble in water, and divide the weight in air by the loss of weight in water. If it is soluble, weigh in a liquid of known specific gravity, which will not dissolve it, and by the rule of proportion calculate as above.

Copy the formula below using for weights and measures grains and drams, minims, ounces and fluid-ounces instead of the metric system; also estimate the price per pint upon the following basis. The calcium, potassium and sodium salts costs 68 cents a pound, the iron and manganese salts $1.20 per pound, quinine hydrochloride 60 cents per ounce, citric acid and potassium citrate each 46 cents per pound.

℞.	Calci hypophos	35	
	Potassii hypophos.	17	5
	Sodii hypophos.	17	5
	Ferri hypophos	2	25
	Mangani hypophos	2	25
	Potassii citrat.	5	
	Acidi citrici	2	
	Quininæ hydrochlorid	1	125
	Tincturæ nucis vomicæ	22	
	Sugar	775	
	Water	q. s. ad. 1000	C.c.

℞.	Calcii hypophos	1 oz. av. gr. 73
	Potassii hypophos.	256 gr.
	Sodii hypophos.	256 gr.
	Ferri hypophos.	33 gr.
	Mangani hypophos	33 gr.
	Potassii citrat	74 gr.
	Acidi citrici	29 gr.
	Quininæ hydrochlorid	16½ gr.
	Tr. nucis vomicæ	334 m.
	Sugar	25 oz. av. 375 gr.
	Water	q. s. ad. xxxii.

Cost per pint, 14 cents.

What is a precipitate?

Solid matter separated from a solution by heat, light, or chemical action.

Why do most precipitates gravitate to the bottom of the vessel in which they are formed? Name one or more.

Because they are heavier than the liquid, *e. g.*, calcium carbonate and calcii phosphas praecipitatus.

All official cerates contain wax, as indicated by the name; in four of them white wax is used, in the other two yellow wax is used. Give the names of the two cerates containing the yellow wax.

Ceratum resinae and ceratum resinae compositum.

Pyroxylin. What is the pyroxylin of the U. S. P. and in what menstruum is it soluble?

It is gun-cotton, a product of the action of nitric and sulphuric acids on cotton. It is soluble in ether and alcohol mixed.

Is the official pyroxylin true gun-cutton and explosive?

No.

Chemically the series of pyroxylins are called nitro-celluloses, the two important varieties are designated as di-nitrocellulose and tri-nitro-cellulose; which of these is the true or explosive gun-cotton?

Hexa-nitro-cellulose is the true gun-cotton.

Why does the pharmacopoeia designate or term the pyroxylin as soluble gun-cotton? Is the true or explosive variety soluble in the same menstruum as the official?

To distinguish it from the explosive variety, which is not soluble. The true gun-cotton is insoluble.

Name the collodions of the U. S. P.

Collodium flexile, styptic, cantharidal, and collodion.

Which is used for blistering and which for arresting slight hemorrhage from abrasions of the skin?

Cantharidal for blistering and the styptic for the hemorrhage.

Which one of the collodions contains Canada turpentine and castor oil and why?

These are added to make the flexible variety, to prevent excessive contraction when the ether has evaporated.

What four collodions are mentioned in the national formulary?

Iodized, iodoform, croton oil, and compound salicylated collodions.

Give the component parts of the corn collodion of the national formulary and its Latin title.

Salicylic acid, extract of Indian hemp, alcohol, and flexible collodion. Collodion salicylatum compositum.

Give the Latin name for the detannated tincture of cinchona.

Tinctura cinchonae detannata.

For what purpose is it detannated?

To obviate the action of tannic acid on the stomach and to permit the addition of tincture of iron without discoloration.

What effect do salts of iron have upon tinctures or fluidextracts containing tannin?

It colors them a blue-black (ink).

Why is elixir of pepsin and bismuth considered of doubtful therapeutic value?

Pepsin is soluble in acid media and bismuth in alkaline, and it is found the bismuth inhibits the action of pepsin.

Why is carmine generally not a good coloring agent for elixirs?

It often makes a cloudy mixture and is not permanent.

Why would carmine be a better coloring agent than cudbear in elixir of ammonium valerianate?

Cudbear is active in acid media, while elixir of ammonium valerianate is alkaline.

If a customer should report to you, in the absence of his physician, that he had been using any one of the official arsenic solutions for some time, and was suffering from puffy and swollen features, dryness and burning in the throat, burning abdominal pains and diarrhoea, stools often mixed with blood, what advice would you give the man?

Stop the medicine, as these are symptoms of arsenical poisoning.

Name the six official cerates.

Ceratum, ceratum camphorae, ceratum cantharidis, ceratum resinae, ceratum plumbi subacetatis, and ceratum resinae compositum.

Give the formula including weight of component parts of the official cerate or ceratum.

White wax, 300 gm.; white petrolatum, 200 gm.; benzoinated lard, 500 gm.

Mention an official cerate which contains a (1) liquor, (2) liniment, (3) volatile oil.

(1) Ceratum plumbi subacetatis. (2) Ceratum camphorae. (3) Ceratum resinae compositum.

Define the following terms: (1) Pharmacognosy, (2) Adulteration, (3) Sophistication, (4) Admixture, (5) Substitution, (6) Simple microscope, (7) A compound microscope, (8) Define a lens. (9) What is an iris diaphragm, (10) What is a camera lucida?

(1) The science of crude drugs.

(2) The practice of adding foreign material fraudulently to cheapen the product or increase the profit.

(3) Synonymous with adulteration.

(4) The process of mixing, or the product of mixing, two or more bodies; often applied to mixing a drug with a specimen of the same drug of an inferior quality.

(5) The act of offering another article than the intended.

(6) An instrument for increasing the apparent size of objects by the use of a single lens.

(7) An instrument consisting of two or more lenses for increasing the apparent size of objects.

(8) The transparent substance (a special form of glass) which focuses and enlarges the size of objects.

(9) An opaque shutter capable of altering the size of a central orifice for the purpose of increasing or decreasing the light passing through it.

(10) An optical instrument which brings out the lines of objects with clearness for sketching.

How many fluid ounces in 500 grammes chloroform (spec. gravity 1.49)?

11⅙ fluid ounces.

At $1.05 per 500 grammes, what will a fluid ounce cost?

9½ cents.

At 58 cents a pound of chloroform (specific gravity 1.49) what will a fluid ounce cost.?

About six cents.

At 72 cents per pound of ether (specific gravity .725) what will a fluid ounce cost?

3$\frac{3}{7}$ cents.

If 250 grammes of F. Ipecac cost $385.00 what will a fluid ounce cost if the quantity measures nine fluid ounces.

$42.77.

From what is iodine obtained?

Seaweed, and associated with sodium nitrate in the saltpetre beds of South America.

What are its compounds with other elements called?

Iodides.

Name the test for free iodine in solution.

The starch test.

What acid is formed by iodine and hydrogen?

Hydriodic acid.

Name the ingredients which enter into the composition of the following preparations, and give the unabbreviated official name of each. (1) Spirit of mindererus, (2) Lugol's Solution, (3) Basilicon Ointment, (4) Huxham's Tincture, (5) Friar's Balsam.

(1) Liquor ammonii acetatis :: Ammonium carbonate and diluted acetic acid.

(2) Liquor iodi compositus :: Iodine, potassium iodide, distilled water.

(3) Ceratum resinae :: Resin, yellow wax, lard.

(4) Tinctura cinchonae composita :: Red cinchona, bitter orange peel, serpentaria, glycerin, alcohol, and water.

(5) Tinctura benzoini composita :: Benzoin, purified aloes, storax, balsam of tolu, and alcohol.

What reaction takes place in the following prescription? Would you dispense it?

℞.	Potassii cyanidi	gr. vi
	Morphinæ sulphatis	gr. ii
	Acidi citrici	ʒ iss
	Syrupi	q. s. ad. ℥ viii.

S.—1ʒ t. i. d.

The citric acid decomposes the cyanide forming hydrocyanic acid, which precipitates the morphine salt. I would not dispense it without consulting the physician.

Write English name of each ingredient and the quantity of each in words.

℞.	Acidi gallici	3	5
	Spt. vin. rect.	4	6
	Glycerinæ	30	
	Mist. camphoræ	ad. 300	

M. Ft. Mistura.

℞.	Gallic acid	three grammes and fifty centigrammes.
	Alcohol	$4\frac{6}{10}$ cubic centimeters.
	Glycerin	thirty cubic centimeters.
	Camphor mixture	enough to make three hundred cubic centimeters.

A physician desires to order a 10 *M.* dose of the oil of turpentine, and also desires to place the responsibility of preparing a well-finished and palatable product or mixture upon the dispensing pharmacist, and writes his prescription as follows:

℞.	Ol. terebinthinæ	mclx.
	Fiat mist. sec. artem.	℥ii.

Sig.—ʒi as dir.

℞.	Olei gaultheriæ	mx
	Olei terebin. rect.	fmclx
	Olei amygdalæ exp.	ʒj
	Syrupi	ʒiv
	Acaciæ	ʒiij
	Aquæ dest.	q. s. ad. ℥ij.

Sig.—ʒj as directed.

Write out the full formula exactly as you would prepare it to comply with the wishes of the physician.

Introduce acacia into dry bottle and the oil and shake thoroughly, then add five drachms of water and shake until emulsified. Then add syrup and remainder of water. Flavor if desired.

Describe the capsules so frequently used in dispensing unpleasant remedies. Of what material are they made?

A mixture of water, gelatin and glycerin of varying proportions is melted until uniform, and by means of moulds made into globular or elongated shapes and hollow. They are elastic, soluble in water, and somewhat sweet to the taste.

Should all solid or powdered remedies be first made into a mass before placing them into capsules? Give a reason for or against this practice?

No. If they are made into a mass the liquid ingredient may so act on them or coat them as to make them undigestible, and thus useless.

What are cachets? Describe them. Are they used for other than powdered drugs?

Cachets are made of Hungarian flour and pressed into wafer-like envelopes consisting of two parts somewhat hollow or depressed, which when moistened and sealed completely enclose the drug. They are used for powders only.

What three kinds of suppositories are mentioned in the U. S. P.?

Vaginal, rectal and urethral.

Give the formula of one official suppository.

Glycerin, monohydrated sodium carbonate, water, stearic acid.

Give the ordinary American name for the syrup in the following prescription; name the precipitate formed in the mixture, and state how the prescription should be dispensed.

℞.	Morphinæ sulph.	gr. i
	Tr. gambir comp.	ʒ ii
	Tr. zingiberis	℥ss
	Syr. ejusdem q. s. ad.	℥ ii.

Mds.—ʒ i in aq. ev. 2 or 3 hours. DR. B.

Syrup of ginger, morphine tannate. Mix the tinctures, add the syrup in which the morphine sulphate was previously dissolved. Dispense with a "shake" label.

State how this prescription should be compounded. What action is to be anticipated and what caution exercised?

℞.	Spt. etheris nit.	ʒvi
	F. buchu.	
	F. uva ursa ana	ʒiv
	Syrupi q. s. et fiat.	℥iv.

Mds.—ʒi four times a day. Dr. M.

Mix the two fluidextracts. Mix the spt. etheris nit. with sufficient syrup and add to the fluidextracts. If possible, set aside awhile or caution the patient to leave the cork out of the bottle. A reaction occurs between the tannic acid in the f. buchu and the nitrous radical of the spt. nitrous ether, and gases may generate producing explosive compounds.

How would you compound this prescription in order to produce a clear, sightly mixture?

℞.	Liq. ammonii acet.	℥iv
	Acidi acetici	ʒi
	Tr. ferri chlor.	℥ss
	Glycerin	℥ss
	Mucilaginæ acacia ad.	℥viii.

M.—ʒi ev. three hours. Dr. W.

Add the acetic acid to the liquor ammonii acet., then successively the tr. ferri chlor. and mucilage of acacia.

The official camphor liniment contains 200 parts of camphor by weight in 1000 parts of liniment; the official belladonna liniment contains only 50 parts of camphor in 1000 parts of fluidextract of belladonna, what can be the object of adding so small a quantity of camphor, does it possess any therapeutic value in so small a quantity?

Camphor externally is anodyne and stimulant, and has a distinct value in the belladonna liniment as a synergist to the belladonna, hence it is present in smaller quantity in this preparation.

What is belladonna liniment used for?

As an anodyne, antispasmodic and antiphlogistic.

In making chloroform liniment it sometimes separates into two layers. What causes this?

If the soap liniment used in making the chloroform liniment has been made from soap shavings, and not powdered or granulated as directed by the Pharmacopœia, there is an excess of water, which throws out the chloroform.

In the manufacture of soap liniment some previous pharmacopoeias directed the use of bar soap, in shavings, the present or eighth revision directs the use of dried and granulated soap. Give the reason for this:

The amount of water in the bar soap always varied and was not accounted for in weighing the soap, therefore sometimes there was an excess of water, which was objectionable. The present way calls for a definite amount of soap without the water, and the finished product is always the same.

Give a rèason for the sale of cheap and adulterated drugs.

The practice is always dishonest and can have no excuse.

What is the purpose of the law against the sale of adulterated drugs?

It protects the patient and gives a permanence to drug values not obtained in any other way.

What does the law of Pennsylvania consider a poison?

Any drug or preparation which, according to standard works on materia medica and pharmacy, is destructive or dangerous to human life in quantities of 60 grains (minims for liquids) or less.

What precaution is necessary in selling certain kinds of poisons?

All poisons should be dispensed with a poison label attached, and those destructive to human life in doses of 5 grains or less (minims for liquids) should be registered in a book kept for the purpose and termed a "Poison Register."

Certain agents, which are used for immoral or unlawful purposes, should never be dispensed except on the prescription of a licensed physician.

Name the poison for which lime or lime water is an antidote.

Oxalic acid and oxalates.

Common salt is an antidote for a certain poison; name it.

The silver salts.

The white of eggs is an antidote for a certain poison; name it.

Mercury salts especially, but also for antimony, chromium, copper, iodine, zinc, their compounds and preparations.

Define percolation.

Percolation or displacement is the process whereby a powder contained in a suitable vessel, termed a percolator, is deprived of its soluble constituents by the descent of a solvent through it.

What two forms of percolators does the pharmacopoeia direct to be used, and state what class of substances are best percolated in each?

A cylindrical or only slightly tapering percolator may be used for drugs which are not liable to swell, and when the menstruum is strongly alcoholic, or when ether or some other volatile liquid is used for extraction.

For drugs which are apt to swell, particularly when a feebly alcoholic or an aqueous menstruum is employed, a conical percolator is preferable.

Why should the drug be moistened before it is placed in the percolator?

To prevent swelling of the drug and thus clogging the percolator, to promote absorption of the menstruum, and to facilitate extraction of the active constituents.

Name the limit of rapidity (in drops per minute) by which percolation should be allowed to flow.

Ten to thirty drops in a minute.

State why calcium phosphate is used in making medicated waters.

The object in using the calcium phosphate is to divide thoroughly the oil or volatile liquid and expose a greater surface, so that the water in filtering through it may become completely saturated.

State why hydrochloric acid is used in making lunar caustic.

Pure fused silver nitrate is very brittle when cool, but the addition of hydrochloric acid produces sufficient silver chloride to toughen it, so that the cast cones or sticks will not break so readily.

State why alcohol is used in making syrup of orange peel?

To dissolve out the volatile oil to which the orange peel owes its virtues.

State why potassium hypophosphite is used in making syrup of hydriodic acid.

To liberate some hypophosphorous acid, which renders the syrup more stable and prevents liberation of free iodine.

State why glycerin is used in preparing clarified honey.

To retain it in the liquid state and aid in its preservation.

State why hydrochloric acid is used in preparing purified animal charcoal.

The hydrochloric acid separates the calcium phosphate and carbonate which are invariably present in the crude boneblack.

State why benzin is used in preparing mustard paper.

To deprive the black mustard of its fixed oil, which interferes with its vesicating power.

Why is expressed oil of almonds used in preparing emulsion of chloroform?

The fixed oil is necessary in order to emulsify the chloroform.

Explain the use of the diluted acetic acid in Basham's Mixture.

The diluted acetic acid is added to render the solution decidedly acid, as it precipitates when the reaction is alkaline.

What is the object of potassium iodide in Lugol's Solution?

The potassium iodide increases the solubility of the iodine in water.

Define percentage.

By percentage we understand the relative parts in a hundred.

If the list price of a drug is two dollars, and you buy it at a discount of forty and sixteen per cent, what will the net cost be?

Deducting forty per cent from list price makes one dollar and twenty cents, and deducting sixteen per cent from this leaves one dollar and one cent as the net cost.

If the list price of a drug is two dollars and you buy it at a discount of fifty per cent, what will the cost be?

One-half of the list price, or one dollar.

If a drug costs you one dollar and you sell it at an advantage of one hundred per cent, what is the amount it is sold for?

Another time its cost price, or two dollars.

What are plasters?

Plasters are substances intended for external application of such consistency that they adhere to the skin, and require the aid of heat in spreading them.

Name the ingredients contained in emplastrum belladonnae U. S. P.

Alcoholic extract of belladonna leaves, resin plaster, soap plaster.

What are solutions?

Aqueous solutions of non-volatile substances.

Name the ingredients employed in making Fowler's Solution.

Arsenous acid, potassium bicarbonate, compound tincture of lavender, and water.

What are suppositories?

Suppositories are solid bodies intended to be introduced into the rectum, urethra or vagina to produce medicinal action.

Name the ingredients employed in preparing suppositoria glycerini.

Glycerin, sodium carbonate and stearic acid.

Give the official Latin name for each of the following: (1) Mercurous iodide, (2) yellow iodide of mercury, (3) green iodide of mercury, (4) proto-iodide of mercury, (5) red precipitate, (6) mercuric oxide, (7) red oxide of mercury, (8) mercuric iodide, (9) biniodide of mercury, (10) yellow oxide of mercury.

For (1), (2), (3) and (4), being the same, the official name is hydrargyri iodidum flavum. (5) and (7) Hydrargyri oxidum rubrum. (6) Mercuric oxide may be the red oxide, hydrargyri oxidum rubrum, or the yellow oxide, hydrargyri oxidum flavum, being the same chemically. (8) and (9) Hydrargyri iodidum rubrum. (10) Hydrargyri oxidum flavum.

What is tragacanth, and name its constituents.

A gummy exudation from Astragalus gummifer and other species of Astragalus, natural order Leguminosae.

It consists of 33% of bassorin, or insoluble gum, 53% of soluble gum, 11% of water, and 3% of impurities.

Wherein does the portion soluble in water differ from acacia?

It differs from acacia in according no precipitate with potassium silicate or ferric chloride.

If powdered tragacanth costs one dollar a pound, how much in excess of its actual value is paid if it contains 25 per cent of starch?

Twenty-five cents, as it is one-fourth powdered starch.

How much cocaine hydrochloride is required to make one fluid ounce of a four per cent solution?

455.7 (grains in fluid ounce) $\times$ 4% = 18.22 grains (18¼).

What is methyl alcohol?

Rectified wood alcohol, CH_3OH.

From what is it obtained and give its properties?

By the destructive distillation of wood. It is a clear, transparent liquid resembling ordinary alcohol, and has about the same density. It is miscible with alcohol, water or ether, and burns with a bluish flame. It has a peculiar, empyreumatic odor.

What is methyl salicylate, and how may it be prepared?

A colorless or slightly yellowish liquid prepared by distilling salicylic acid or a salicylate with methyl alcohol and strong sulphuric acid. Composition, $CH_3C_7H_5O_3$.

Describe methyl salicylate and give its medical properties.

A colorless or slightly yellow liquid having a strongly aromatic odor and the sweetish warm and aromatic taste of oil of gaultheria, neutral or slightly acid reaction. Soluble in all proportions in alcohol, carbon disulphide or glacial acetic acid. Specific gravity 1.183 to 1.185 at fifteen degrees C. Boiling-point 219-221° C. Optically inactive.

Medical properties same as oil of gaultheria. Used in rheumatism and neuralgia.

Name two plants from which methyl salicylate may be obtained.

Gaultheria procumbens (Family Ericaceæ) and Betula lenta (Family Betulaceæ).

Give the official Latin names of each product of said plants.

Oleum gaultheriae and oleum betulae.

How would you detect methyl alcohol in an alcoholic mixture?

If 10 C.c. of alcohol be mixed in a test-tube with 5 C.c. of potassium hydrate, there should not be an immediate darkening of the liquid.

What is a mixture?

A mixture is an aqueous liquid preparation intended for internal use which contains suspended insoluble substances.

Name the ingredients contained in mistura rhei et sodae.

Sodium bicarbonate, fluid extract of rhubarb, fluid extract of ipecac, glycerin, spirit of peppermint, and water.

What is an emulsion?

Emulsions are liquid preparations in which fats, oils or oleo-resinous substances are suspended in water, usually by the intervention of some gummy or mucilaginous substance.

Name the ingredients contained in emulsum chloroformi?

Chloroform, expressed oil of almond, tragacanth, and water.

Name the ingredients contained in each of the following: (1) Number Six, (2) Friar's Balsam, (3) Dover's Powder, (4) Basilicon Ointment, (5) Goulard's Extract, (6) Paregoric, (7) Cox's Hive Syrup, (8) Compound Licorice Powder, (9) Brown Mixture, (10) Spt. Mindererus.

(1) Tinctura myrrhae et capsici (N. F.) (hot drops). (2)

Balsamum traumaticum (N. F.), containing benzoin, aloes, storax, balsam of tolu, balsam of Peru, myrrh, angelica root, and alcohol, but the official tinctura benzoini composita is a simplified preparation intended to replace the above compound. (3) Pulvis ipecacuanhae et opii, containing powdered opium, powdered ipecac, and sugar of milk. (4) Ceratum resinae, composed of resin, yellow wax, and lard. (5) Liquor plumbi subacetatis, composed of lead acetate, lead oxide and distilled water. (6) Tinctura opii camphorata, composed of powdered opium, benzoic acid, camphor, oil of anise, glycerin, and diluted alcohol. (7) Syrupus scillae compositus, composed of fluid extract of squill, fluid extract of senega, antimony and potassium tartrate, precipitated calcium phosphate, sugar, and water. (8) Pulvis glycyrrhizae compositus, composed of powdered glycyrrhiza, senna, oil of fennel, washed sulphur, and sugar. (9) Mistura glycyrrhizae composita, composed of pure extract of glycyrrhiza, syrup, mucilage of acacia, camphorated tincture of opium, wine of antimony, spirit of nitrous ether, and water. (10) Liquor ammonii acetatis, composed of ammonium carbonate and diluted acetic acid.

What is chrysarobin and from what is it obtained?

It is a neutral principle (in its commercial more or less impure form) extracted from goa powder, a substance found deposited in the wood of Andira araroba, Family Leguminosae.

The U. S. P. formula for chrysarobin ointment is as follows:

Chrysarobin	5 Gm.
Benzoinated lard	95 Gm.

How much of each ingredient would you use to make one troy ounce of the ointment? How much of each for an avoirdupois ounce?

For a troy ounce	Chrysarobin	24 grains.
	Benzoinated lard	456 grains.
Avoirdupois ounce	Chrysarobin	21.87 grains.
	Benzoinated lard	415.63 grains.

How is alcohol obtained?

The natural sources of alcohol are starch and sugar as they exist in various plants, and alcohol, if pure, is the same from whatever source it is derived. It is generally made by distilling whisky, and redistilling and rectifying the distillate in an apparatus termed an alcohol column and still.

Give the Latin title of each form under which it is official, and the percentage strength of each?

Alcohol, 92.3% by weight, 94.9% by volume. Alcohol absolutum, containing not more than 1% by weight of water. Alcohol deodoratum (U. S. P. 1890), 92.5% by weight, 95.1% by volume. Alcohol dilutum, 41% by weight, 48.9% by volume.

Why is alcohol so much used in pharmacy?

On account of its valuable solvent and preservative properties.

What is absolute alcohol and how may it be prepared?

Absolute alcohol is the strongest alcohol that can be prepared, and it is intended to be absolutely free from water. It is prepared by percolating the strongest and purest alcohol attainable through recently burnt lime, out of contact with air, and then redistilling the percolate in vacuo.

What is meant by proof spirit?

Alcohol that contains 50% per volume of absolute alcohol.

What are the State and United States requirements for the sale of alcohol by pharmacists?

The pharmacist must take out a special license every twelve months from the United States Government officials, which costs twenty-five dollars annually. This allows the pharmacist the privilege of using alcohol in preparing medical preparations and its use in prescriptions, written by a licensed physician.

How are compressed tablets made?

Compressed tablets are made by subjecting dry powders to a sufficient degree of pressure in suitable machines to cause them to cohere.

What are their advantages and disadvantages?

The advantages of compressed tablets are that no excipient is used in their preparation, they are easily disintegrated or dissolved in the fluids of the stomach, and their lenticular shape is favorable to their being easily swallowed.

Their disadvantages are in their being often used for convenience when a special combination is ordered, and if not properly compressed they will disintegrate on dispensing, or if compressed too firmly they may pass through the digestive tract only partly dissolved.

How are tablet triturates made?

Tablet triturates are made by thoroughly triturating medicinal powders with a proper base, usually sugar of milk or powdered sugar, and then adding sufficient of a volatile liquid to make a paste, which is pressed into perforations in a plate of suitable material; then they are removed by a plate, which is studded to correspond to the perforations, and allowed to dry.

What are tablet saturates?

Tablet saturates are made by pouring a medicating liquid over tablet triturates that have been made "in blank," that is, without medication in such a manner as to have a definite quantity on each.

What is chocolate and how is it made?

It is the product of the "chocolate nut," made by expressing the kernels between hot iron plates and thus separating the fixed oil; the residual portion when properly mixed with sugar constitutes the chocolate. These kernels are prepared from the seed of Theobroma cacao, Family Sterculiaceæ.

Give the official Latin name and English name of its fatty constituent.

Latin name is oleum theobromatis and English name is oil of theobroma.

Give its melting-point and use in pharmacy.

Melting-point 86° to 91.4° F. Used as a base for suppositories.

Expand and interpret the following: (1) M. et ft. emuls., (2) M. et ft. Pil. xx., (3) R. Liq. Magn. Cit., Lagenam i., (4) D. tal. Pil. xxx., (5) M. d. in vitro.

(1) Misce et fiat emulsio. Meaning: Mix and make an emulsion. (2) Misce et fiant pilulae XX. Meaning: Mix and make 20 pills. (3) Recipe, liquor magnesii citratis, lagenam i. Meaning: Take thou one bottle of solution of magnesium citrate. (4) Dentur tales pilulae XXX. Meaning: Let 30 such pills be given. (5) Misce, detur in vitro. Meaning: Mix and let it be given in a glass.

How would you compound the following? State in words, not figures, how much of each ingredient is to be used.

℞. Magnesii carb.	.60
Pulv. doveri	.06
Hydrarg. chlor. mite	.06
Sacchari lact.	.20

Dent. tal. Dos. vi.

Mix the calomel with the sugar of milk, then incorporate the Dover's powder and magnesium carbonate, mixing well, and divide into six powders, having taken six times the amount of each ingredient.

Magnesium carbonate	six decigrammes.	in each powder.
Dover's powder	six centigrammes.	
Calomel	six centigrammes.	
Sugar of milk	two decigrammes.	

How would you compound the following?

℞. A. C. E. Mixture.. { Chloroform 2 parts. Alcohol 1 part. Ether 3 parts. } mix together.

Sig.—For Anæsthesia.

In the following prescriptions state: (1) In the case of liquids, whether or not clear solutions can be obtained. (2) Opinion as to incompatibility and safety in administration. If incompatible, why?

℞.	Pulv. ext. glycyrrhiz.	ʒj
	Chloral hydratis	ʒij
	Sacch. lact.	ʒj
	Pulv. camphor	ʒj.

M. ft. Pul. et in Cht. xii Div. Sig.—One every four hours.

When the chloral and camphor are combined they produce an oily fluid, and when remaining powders are added, a paste; so that this cannot be dispensed as written. Consult the physician.

℞.	Potass. bromidi.	
	Chloral hydratis	aa. ℥ss
	Spt. ammon. arom	℥j
	Syr. aurant. cort	℥ij
	Aq. menth. pip.	ad. f℥viij.

M. ft. Mist. Sig.—A tablespoonful on retiring.

This prescription produces a turbid mixture on the addition of the aromatic spirit of ammonia, and should be dispensed with a "shake well" label.

℞.	Potass. acet.	
	Potass. citr.	aa. ʒiij
	Sacchar. alb.	ʒj.

M. ft. Pulv. et in Chart xii Div. Sig.—One every three hours.

The potassium acetate and citrate being very deliquescent, liquefy when mixed, and then dissolve the sugar, so that it cannot be dispensed as written. Consult physician.

℞.	Strychninæ sulph.	grs. iv
	Tr. digitalis	ʒx
	Spt. ammon. aromat.	℥j
	Elix. simplicis	ad. ℥viij.

M. et. ft. Sol. Sig.—A teaspoonful three times a day.

In the first place, the dose of strychnine, $^1/_{16}$ grain, is too large; only used in exceptional cases in this dosage; therefore consult physician as to dose.

Then the strychnine would precipitate out as an insoluble carbonate and form a dangerous compound with the aromatic spirit of ammonia, so that it is chemically incompatible, and should not be dispensed as written. Dosage should be certified, and then only dispensed after careful instructions as to shaking well, and then only after explaining the above incompatibility to the physician ordering the same.

Differentiate between a dispensatory and a pharmacopoeia.

A pharmacopœia is a book containing a list of medicinal substances, with descriptions, tests and formulas for preparing the same, as established by recognized pharmaceutical authority. The pharmacopœia contains only official preparations. A dispensatory is a commentary on the pharmacopœia containing both official and non-official substances.

Why are you obliged to register a sale of paris green when sold to a merchant?

Because it is a poison that is destructive to human life in doses of five grains, and in this instance it would not be used as an insecticide for agricultural purposes; hence it should be registered.

Name an instance in which you are not obliged to register a sale of paris green.

When sold to farmers for agricultural purposes, the law does not require registration of the sale.

Under what circumstances are you obliged to register the sale of rough on rats?

Under all circumstances, except when used as an insecticide by agriculturalists, owing to the large amount of arsenic in its composition.

Define specific gravity.

Specific gravity is the weight of one body compared with the weight of an equal bulk or volume of another body selected as a standard, both bodies being at the same temperature.

What substances are taken as the standard for solids, liquids and gases?

For solids and liquids, water is taken as the standard; for gases, hydrogen is often taken as a standard, and it is also the standard for the elementary substances.

Describe the method of ascertaining the specific gravity of a solid.

Divide the weight of the substance in air by the loss of weight in water. (This represents the weight of the water displaced.)

If powder weighs in air 105.30 grains, the bottle with powder and water weighs 1095.62 grains, the bottle filled with water only weighs 995.74 grains, what is the specific gravity of the powder?

As the bottle when filled with water alone weighs 995.74 grains, and as the weight of the powder in air is 105.30 grains, both together weigh 1101.04 grains. 1101.04 grains less 1095.52 grains (weight of water, bottle and powder) gives 5.52 grains. Then apply the rule: $\frac{105.30}{5.52} = 19.076$, the specific gravity of the powder.

Name the symptoms by which you would recognize poisoning by the following; mention antidote for each: (1) Antipyrin, (2) Cocaine, (3) Colchicum, (4) Colocynth, (5) Morphine.

(1) Antipyrine. Symptoms: Profuse sweating, vomiting, collapse, salivation, dyspnœa and epileptiform convulsions, but most characteristic is a peculiar livid discoloration of the surface of the body, especially the extremities, which is an early symptom of intoxication. Antidote: Diffusible stimu-

lants, such as ether and alcohol, heart tonics, strychnine or strophanthus, digitalis, artificial respiration, inhalation of oxygen, and heat.

(2) Cocaine. Symptoms: Weak and rapid pulse respirations, labored and shallow, and oppression of the chest is often complained of, with threatening collapse, clammy skin, hallucinations, and delirium. Antidote: Ammonia and amyl nitrite for the cardiac depression; alcohol and opium, with artificial respirations and heat. Chloral, chloroform and ether are therapeutical antagonists.

(3) Colchicum. Symptoms: Violent vomiting and purging (first serous, then mucous and bloody), or acute gastro-intestinal irritation. Marked symptoms of collapse supervene: the pulse becomes small, rapid and thready; the skin cold and bedewed with sweat, respiration slow and faint. Death from collapse, the brain remaining clear to the last. Antidote: Tannic acid to retard absorption, best administered in form of strong tea or coffee. Encourage vomiting, using emetics and cathartics, morphine and atropine, and oils are of service. If collapse, heat and vascular stimulants are required.

(4) Colocynth. Symptoms: Gastro-intestinal irritation, griping and purging and marked prostration, later coma and death. Antidote: Demulcents, such as flaxseed or slippery elm, bland oils, strong tea or coffee, stimulants, morphine for pain, astringents.

(5) Morphine. Symptoms: Cold and clammy sweat, very slow pulse, slow and stertorous respiration, gradually becoming feeble and irregular. Cyanosed face, abolished reflexes, coma gradually deepening, the pupils minutely contracted, but dilating as the end approaches, and finally death by paralysis of the respiratory center. Antidote: Promptly-acting emetics in large doses, because of the stomach's insensitive condition, such as zinc or copper sulphate, ipecac or apomorphine hypodermatically, then a pint or two of warm coffee should be injected into the stomach and rectum. Arti-

ficial respiration by Sylvester's method; application of the faradic current, one pole to the cervical region, and the other over the ensiform cartilage, strychnine and atropine for the vascular and respiratory systems, amyl nitrite and ammonia by inhalation. Rectal injections of tincture of capsicum ʒss to j for the coma, potassium permanganate is the best antidote for morphine in the stomach, given in doses about one-half greater than the quantity of morphine present, and repeating in less quantity at short intervals. Keep patient awake and in motion if possible.

Give the five synonyms for hydrargyri iodidum flavum.

Yellow iodide of mercury, proto-iodide of mercury, green iodide of mercury, mercurous iodide, hydrargyri iodidum viride.

Name the three synonyms for hydrarguri iodidum rubrum.

Mercuric iodide, biniodide of mercury, red iodide of mercury.

Give the Latin official name, medical use and dose of Turpeth Mineral.

Hydrargyri subsulphas flavus. Used as an alterative in doses of one-fourth to one-half a grain. In larger doses, emetic.

Give the U. S. P. definition for vinum album.

An alcoholic liquid made by fermenting the juice of fresh grapes, the fruit of vitis vinifera (Family Vitaceæ) freed from seeds, stems and skins.

When vinum album is prescribed, what domestic wine may be used?

Sherry wine.

What per cent of alcohol should it contain?

10 to 14% by weight (12.4 to 17.3% by volume).

Give the U. S. P. method of ascertaining the percentage of alcohol present in wine.

Take the specific gravity to four decimals of a sufficient portion of the wine, carefully measured at the temperature of 15.6° C. (noting its weight also). Evaporate the wine in a tared capsule to one-third of its original weight, cool and add water until the liquid measures its original volume at 15.6° C., then take the specific gravity to four decimals again. The difference between the two specific gravities deducted from 1.0000 corresponds to the specific gravity of an alcohol containing the same percentage of absolute alcohol, by weight or volume, as the wine under examination, the corresponding percentage being ascertained by referring to the (alcoholmetrical) table.

Name three official preparations in which white wine enters.

Vinum antimonii, vinum colchici seminis, vinum ergotae.

From what are the following prepared? Give medical properties of each: (1) Codeine; (2) Apomorphine; (3) Homatropine; (4) Acetanilid; (5) Salol.

(1) Codeine from opium; sedative and anodyne. (2) Apomorphine from morphine; emetic. (3) Homatropine from atropine; mydriatic. (4) Acetanilid from analine oil and *glacial* acetic acid; antipyretic, diaphoretic, analgesic. (5) Salol from salicylic and carbolic acids; intestinal antiseptic.

Name the prinicipal aklaloids found in opium.

Morphine; codeine; papaverine; thebaine, narcotine, narceine and hydrocotarnine. Altogether nineteen alkaloids are present.

Give the analytical reaction for morphine.

Morphine with nitric acid gives an orange-red color. On shaking a small portion of morphine in a test-tube with 10 C.c. of chlorine water the latter will acquire a yellowish color. On now carefully pouring a small amount of ammonia water on the surface of the liquid a brown or reddish-brown zone will form at the line of contact. If to a neutral 1% solution of morphine a few drops of ferric chloride T. S. be added, a blue color will result, which is destroyed by acids, alcohol and heat.

Give the analytical reaction for quinine.

The solution of quinine in diluted sulphuric acid has a bluish fluorescence.

On treating 10 c.c. of an aqueous acidulated solution of quinine with two drops of bromine water, and then an excess of ammonia water, the liquid will acquire an emerald-green color. (Thalleioquin test.)

On treating an acidulated solution of quinine with a saturated alcoholic solution of iodine, crystals of an emerald-green color are produced. (Herapathite's test.)

Quinine should not be reddened by nitric acid.

Name the most important precipitants of the alkaloids.

Potassio-mercuric iodide, auric chloride, tannic acid, phospho-molybdic acid and picric acid.

In what manner may the alkaloids be separated from the tissues of animals that have been poisoned?

By dialysis as the most convenient means.

Give botanical name of the plant yielding the following: state what part of the plant constitutes the official drug: (1) Foeniculum, (2) illicium, (3) piper, (4) cubeba, (5) cardamomum.

(1) The fruit of fœniculum capillaceum. (2) The fruit of illicium verum. (3) The unripe fruit of piper nigrum. (4) The unripe fruit of piper cubeba. (5) The fruit of elettaria repens.

What is chloroform?

Chloroform ($CHCl_3$) is a liquid consisting of 99 to 99.4% by weight of absolute chloroform and 1 to 0.6% of alcohol.

It is a heavy, clear, colorless, mobile and diffusible non-inflammable liquid. Specific gravity not below 1.490 at 15° C. (59° F.).

Name the substances which are required for its formation.

It may be made from chlorinated lime, alcohol and water, or by reacting on acetone with chlorinated lime.

Give its solubility in water and alcohol.

Water, 200 parts; alcohol, all proportions.

Give its medicinal properties and dose.

Used as an anesthetic by inhalation. Internally in large doses (one to two fluid drachms) it is narcotic; in small doses (ten to fifteen minims) it is carminative and sedative. Externally, an irritant.

How should the following be dispensed?

℞. Chloroform .... ʒiij
Elix. lactopeptine........ ....ad. f℥iij.
M. Sig.—Teaspoonful after meals.

If dispensed as written, three drachms of chloroform (by weight) should be added to sufficient elixir to make three fluid ounces. However, chloroform is usually dispensed by measure. In either case a "shake well" label should be placed on the bottle.

Define prunus virginiana and when should it be collected?

The bark of prunus serotina (Family Rosaceæ) collected in the autumn.

What effect has age upon it?

If too old it contains an excess of tannic acid and less of the active constituents, which are somewhat volatile in character.

What odor is developed on maceration in water and to what is this due?

A bitter almond odor. The bark contains amygdalin and a ferment emulsin which in contact with water results in the production of oil of bitter almond and hydrocyanic acid.

Name the ingredients and mode of preparing each of the following: (1) Infus. Digitalis, (2) Spt. ammonia arom., (3) Mist. glycyrrhizae comp., (4) Tinct. catechu comp., (5) Unguentum aquae rosae.

(1) Infusion of digitalis. Ingredients: Digitalis (bruised), alcohol, cinnamon water, boiling water, cold water. Upon the digitalis contained in a suitable vessel pour boiling water and allow it to macerate until the mixture is cold, then strain, add the alcohol and cinnamon water to the strained liquid, and pass enough cold water through the residue in the strainer to make the product measure the specified quantity.

(2) Aromatic spirit of ammonia. Ingredients: Ammonium carbonate, ammonia water, oil of lemon, oil of lavender flowers, oil of nutmeg, alcohol, distilled water. To the ammonia water contained in a flask add a portion of the distilled water, and afterwards the ammonium carbonate reduced to a moderately fine powder, close and agitate occasionally, allowing to stand at least six hours, the ammonia converting the bicarbonate into the neutral carbonate and the water converting the carbamate into the carbonate, the above time being necessary to effect this change. Introduce the alcohol into a graduated bottle of suitable capacity, add the oils, then gradually add the solution of ammonium carbonate, and afterwards enough distilled water to make up to the proper quantity. Set aside for 24 hours, then filter.

(3) Compound mixture of glycyrrhiza. Ingredients: Pure extract of glycyrrhiza, camphorated tincture of opium, syrup, acacia granulated, spirit of nitrous ether, water, wine of antimony. Rub the pure extract of glycyrrhiza and acacia in a mortar with a portion of the water until it is dissolved, transfer to a graduated vessel containing the other ingre-

dients, and rinse the mortar with sufficient water to make desired volume.

(4) Compound tincture of catechu. Ingredients: Catechu, cinnamon (cassia), diluted alcohol. Mix the powders, and without moistening pack the mixture firmly in a cylindrical percolator; then gradually pour diluted alcohol upon it to make desired volume of percolate. This is no longer official.

(5) Ointment of rose water. Ingredients: Spermaceti, white wax, expressed oil of almond, stronger rose water, sodium borate. Reduce the spermaceti and white wax to fine shavings and melt them at a moderate heat, then add the expressed oil of almond, pour the mixture into a warm mortar, and add without stirring the stronger rose water in which the sodium borate had previously been dissolved, and stir rapidly and continuously until the mixture becomes uniformly soft and creamy.

What are oleoresins and name the official natural oleoresins?

Oleoresins are mixtures of oils and resins, and the official oleoresins are liquid preparations, consisting principally of natural oils and resins extracted from vegetable substances by percolation with ether or acetone.

The official natural oleoresins are: Terebinthina, copaiba and terebinthina canadensis.

Give the official Latin name of those prepared pharmaceutically.

Oleoresina aspidii, oleoresina capsici, oleoresina piperis, oleoresina zingiberis, oleoresina lupulini, oleoresina cubebae.

Which oleoresin does the Pharmacopoeia direct to be agitated when it is dispensed?

Oleoresina aspidii.

What oleoresin should be separated from the deposit found in it?

Oleoresina cubebae.

Give the common name for juglans and what are its medical properties?

Butternut. It is used as a cathartic and tonic.

When should it be collected, what part of the plant is used, and give its botanical source?

The bark of the root of juglans cinerea collected in autumn. The Family, Juglandaceæ.

What are the approximate equivalents in the apothecaries' wine measure and metric measure of: (1) teacupful, (2) wineglassful, (3) tablespoonful, (4) dessertspoonful, (5) teaspoonful?

(1) Teacupful is four fluid ounces (118.28 C.c.). (2) Wineglassful is two fluid ounces (59.14 C.c.). (3) Tablespoonful is four fluid drachms (14.78 C.c.). (4) Dessertspoonful is two fluid drachms (7.39 C.c.). (5) Teaspoonful is one fluid drachm (3.69 C.c.).

Copy this formula, adding a proper quantity of each ingredient to make eight fluid-ounces of a 50 per cent emulsion of codliver oil, each tablespoonful to contain eight grains of each of the salts. State how you would proceed to make the emulsion.

℞. Cod-liver oil		℥jv
Powd. acacia		℥j
Sugar		ʒjv
Calcium hypophosphite		gr. cxxvjjj
Sodium hypophosphite		gr. cxxvjjj
Oil of sassafras.		
Oil of gaultheria	aa.	mvjjj
Water	q. s. ad.	℥vjjj.

Place the powdered acacia in a perfectly dry mortar and add the oil, mix well; then add two fluid ounces of water all at once; then stir constantly until the whole is emulsified; then add remainder of the water in which the hypophosphites and sugar are dissolved, and then the flavoring, and make it up to desired volume with water.

Copy this formula: Change the weights into grains and state how you would make the troches. What precautions are necessary?

Potassium chlorate in fine powder	30 Gm. =	Gr. 462.96
Sugar in fine powder	120 Gm. =	Gr. 1851.84
Tragacanth in fine powder	6 Gm. =	Gr. 92.592
Spirit of lemon	one C.c. =	16.23 M.

Make 100 troches.

Mix the sugar with the tragacanth and the spirit of lemon by trituration in a mortar; then transfer to a sheet of paper, and by means of a bone spatula mix it with the potassium chlorate, being careful to avoid trituration and pressure, so as to prevent ignition or an explosion. Add water to form the mass, then divide into troches.

How would this prescription be prepared?

℞.	Hydrarg. chlor. mit.	grs. jj
	Pulv. opii	grs. jss
	Tr. ver. viride.	
	Ext. grindeliæ fld.	aa. gtt. xjj
	Tr. acon. rad.	gtt. xxiv
	Sacch. albi	ʒii.

M. et ft. chart No. xjj, dividendi. Sig.—One powder three times daily.

Mix the three liquids with the sugar and evaporate gently on a water-bath, using but little heat; then add the remaining powder and mix well. Divide in 12 equal portions and place in powder papers.

Copy the following prescription, writing out the quantities in words without abbreviations:

			Quantities.
℞.	Tinct. ferri chlor.	twelve and a-half cubic centimeters.	12.5
	Sol. ammon. carb.	sixty cubic centimeters.	60.
	Sol. acid acetic	sixty cubic centimeters.	60.
	Morph. sulph.	two hundred and forty-five milligrammes.	.245
	Elixir aromat.	sixty cubic centimeters.	60.
	Acidi acetici	four and fifteen hundredths cubic centimeters.	4.15

M. ft. mist. sec. art. Sig.—One dessertspoonful every four hours.

First make your solution of ammon. carbonate by dissolving 7 grammes of ammonium carbonate in sufficient quantity of distilled water to make 60 c.c., then dilute the acetic acid U. S. P., taking 17¾ c.c. of acid, and adding sufficient water to make 60 c.c. Then mix these two solutions, and the result is the solution of ammonium acetate U. S. P. Now add your acetic acid and mix well, then the tincture of ferric chloride, and a bright red liquid is produced, due to the formation of ferric acetate in combination with ammonium acetate. Then add the aromatic elixir containing the dissolved morphine sulphate, and dispense with a "shake well" label. It is important that this preparation should be kept distinctly acid, this result being produced by keeping in a cool place and tightly corked.

How would you prepare this prescription?

℞. Infus. rad. valerian	15.0 = (150.0)
Syr. simplicis	30.0

Sig.—A tablespoonful every 3 hours.

Take the valerian root in a coarse powder and place in an infusion mug, and add 150 c.c. of boiling water; then allow to macerate for a half hour; then strain, and add sufficient water to make 150 c.c.; mix this with 30 c.c. of syrup.

Compound syrup of white pine:

White pine bark	1050 gr.
Wild cherry bark	1050 gr.
Balm gilead buds	140 gr.
Spikenard root	140 gr.
Blood root	70 gr.
Morphine sulph.	6 gr.
Chloroform	128 minims
Alcohol	6 oz.
Water	18 oz.
White granulated sugar	20 oz.

Proceed by making 20 fluid ounces of percolate with the menstruum of alcohol and water and the vegetable drugs; dissolve in this the morphine sulphate; then add the chloroform previously mixed with one fluid ounce of alcohol; then add the sugar and stir until dissolved, the whole to measure 32 fluid ounces. The vegetable drugs average 45 cents per pound; morphine sulphate $2.40 per ounce and chloroform 60 cents per pound; alcohol $2.50 per gallon and sugar 6 cents per pound; calculate the cost per pint of the finished product.

The total powders represent 2,450 grains. $\frac{2450}{7000} \times .45 =$ 15.75 cents. Six grains of morphine at $2.40 per ounce are 2.40 ÷ 437.5 gr. in one oz. = .5486 × 6 = 3.29+ cents, cost of morphine. 128 minims of chloroform, specific gravity 1.40, at 65 cents per pound = 1.6 cents. Six oz. av. of alcohol, specific gravity .820, = 6.676 ounces. $\frac{6.676}{128} \times 2.50 =$ 13.03 cents. 20 oz. sugar at 6 cents per pound = 7½ cents.

15.75	cents cost of powders	To make ℥ xxxjj.
3.29	cents cost of morphine..........	
1.6	cents cost of chloroform	
13.03	cents cost of alcohol............	
7.5	cents cost of sugar	

41.17 cents ÷ 2 = 20.585 cents per pint of finished product.

℞. Formin. 5
Mitte talis. Capsules No. L. Sig.—One four times a day.

How would you dispense the above prescription?

Send 50 capsules of 5 decigrammes, or about 7¾ grains each.

Define Mitte.

Mitte is the imperative of mitto to send, and means send thou.

Translate talis.

Talis means of such or a similar kind.

Give the chemical name of formin.

The chemical name is hexamethylenetetramine.

Give the copyright name under which it was first introduced and state what it will cost to purchase one ounce

of formin and how much for the same quantity of the copyrighted article.

Urotropin costs 60 cents per oz. Av.
Formin costs 20 cents per oz. Av.

Copy the following prescription, changing grammes and cubic centimeters into ounces, grains and minims; also state how you would make the mass, and what necessary precautions you would take in its manufacture; also how much potassium chlorate will be contained in each lozenge.

Potassium chlorate in fine powder	30.
Sugar in fine powder	120.
Tragacanth in fine powder	6.
Spirit of lemon	1 c.c.
Water q. s. to make mass and divide into 100 troches.	
Potassium chlorate	463 grains
Sugar	4 oz av. 102 grains.
Tragacanth	93 grains
Spirit of lemon	16 minims.

Mix the sugar with the tragacanth and spirit of lemon by trituration in a mortar; then transfer the mixture to a sheet of paper and, by means of a bone spatula, mix it with the potassium chlorate, being careful, by avoiding trituration and pressure, to prevent the mixture from igniting or exploding. Lastly, with water form a mass and divide into 100 troches. Each lozenge contains about 5 grains.

How would you compound the following prescription?

℞. Creosotum (Beechwood)........................ ʒjj
Aqua distilla.................................. ℥jjj.
M. Sig.—One teaspoonful every 2 hours, in water.

How much creosote would be contained in each teaspoonful of this mixture?

This could either be dispensed as a mixture, adding some powdered acacia, about ʒjj, or an emulsion could be made by the further addition of some fixed oil, or alcohol could be added until clear solution results. Each teaspoonful equals 5 minims.

Calculation: (1) How many fluid ounces in 500 grammes of choloroform, (spec. grav. 1.49)?

One fluid ounce of water equals 29.57 gm. × 1.49 equals 44.06 gm., weight of one fluid ounce of chloroform. 500 divided by 44.06 equals 11.348 + fluid ounces.

(2) If 500 grammes of chloroform cost $1.05, what will one fluid ounce cost?

$1.05 divided by 11.348 equals 9¼ cents (9.25+).

(3) If a pound of chloroform (spec. grav. 1.49) costs 58 cents, what will one fluid ounce cost?

455.7 grains (weight of fluid ounce of water) × 1.49 equals 67.9, weight of chloroform. 58 cents divided by 7000 (grains in avoirdupois pound) equals .00828 cents per grain; 679 × .00828 equals 5.62 cents per fluid ounce.

If one pound of ether (spec. grav. 0.725) costs 72 cents, what will one fluid ounce cost?

455.7 × .725 equals 330.38 grains. 72 cents divided by 7000 equals .0103 cents per grain.

330.38 × .0103 equals 3.403 cents per ounce.

(5) If 200 grammes of fluidextract of ipecac cost $3.85, what will one fluid ounce cost, if the quantity measures nine fluid ounces?

3.85 divided by 9 equals .4277, or 42.77 cents, for one fluid ounce.

Hellebore. (1) Give the official Latin name for American Hellebore and where does it grow?

Veratrum. It grows throughout North America, Canada and the United States, as far south as Georgia.

Give its medicinal properties and uses.

It is an emetic, diaphoretic, vascular sedative, errhine and narcotic poison.

Name the official preparations from the above and give dose of each.

Fluidextractum veratri, minims i to xv; tinctura veratri, minims jjj to ʒj.

Give the name of the plant yielding black hellebore and state where it grows.

Helleborus. The rhizome of helleborus niger. It grows in Southern Europe.

Give its medicinal properties.

It is a drastic hydragogue cathartic and emmenagogue.

Give name of the plant yielding white hellebore and where does it grow.

Veratrum album. It grows in Southern Europe.

What is it principally used for?

It is used chiefly as an insecticide, applied to shrubs and plants, but it is a violent emetic and irritant, being rarely used medicinally. It is now one of the official varieties.

Describe the following drugs as to their physical appearance, color, odor and taste; (1) Nitromuriatic acid, (2) Diluted nitromuriatic acid, (3) Fuming nitric acid, (4) Hydrochloric acid·C. P., (5) Spirit of nitrous ether, (6) Iron sulphate, (7) Litharge, (8) Calamine (native zinc carbonate), (9) Iodoform, (10) Copper sulphate.

(1) Nitromuriatic acid is a golden yellow, fuming, and very corrosive liquid, having a strong odor of chlorine and a strongly acid reaction. Its taste is very sour and corrosive and highly irritant.

(2) Diluted nitromuriatic acid is a colorless or faintly yellow liquid, odorless, or having a faint odor of chlorine, and a very acid taste and reaction.

(3) Fuming nitric acid is a light reddish, fuming, and very corrosive liquid, possessing a peculiar, somewhat suffocating odor, and strongly acid taste and reaction.

(4) Hydrochloric acid, C. P., is a colorless, fuming liquid with a pungent, suffocating odor, intensely acid taste and reaction.

(5) Spirit of nitrous ether is a clear, mobile, volatile and inflammable liquid, of a pale straw-color, inclining slightly to green. Fragrant, ethereal, pungent odor, free from acridity; sharp, burning taste.

(6) Iron sulphate occurs in long, pale bluish-green monoclinic prisms, efflorescent in dry air and absorbing oxygen rapidly on exposure to air, and becoming coated with brownish-yellow basic ferric sulphate. They are odorless, and have a saline, styptic taste and acid reaction.

(7) Litharge is a heavy, yellowish or reddish-yellow powder or minute scales. It is odorless and tasteless. Reaction faintly alkaline.

(8) Calamine is a light pinkish or reddish and somewhat gritty powder, and it is odorless and tasteless.

(9) Iodoform is a fine, lemon-yellow powder or lustrous crystals, peculiar, very penetrating and persistent odor, unpleasant, sweetish and iodine-like taste.

(10) Copper sulphate occurs in large, transparent, deep blue, triclinic crystals, odorless, nauseous, metallic taste.

MATERIA MEDICA.

Give the botanical name of cardamom and its family.

Elettaria repens. Family Zingiberaceæ.

Where does it grow and what part of the plant is official?

It grows in India. The fruit is official.

Name the most important constituent of cardamom and its percentage.

Its volatile oil, which is present to the extent of 5%.

What percentage of seed should good cardamom yield, and what are its medicinal properties?

About 74%. It is used as an aromatic.

Give the botanical name and family of the official variety of Buchu.

Barosma betulina. Family Rutaceae.

Give habitat, height of plant and color of flowers.

Cape of Good Hope; 3 to 4 feet high; flowers are white.

By what ordinary names are they known in commerce?

Long buchu and short buchu.

Name the leaves with which one variety is often mixed.

Long buchu with senna.

What are the chief constituents and medicinal properties of buchu?

Volatile oil, resin, and a bitter principle. Buchu is diuretic.

What is Levant wormseed? Describe it.

The dried flower heads of Artemisia pauciflora. It has the appearance of a granular, yellow-green, shiny powder; taste, bitter-aromatic with a camphoraceous odor.

Name the active principle and give its solubility in water, alcohol, ether, chloroform, and solutions of caustic alkalies.

Santonin. Sparingly soluble in water. Alcohol, 34 parts; ether 78 parts; chloroform and alkalies very soluble.

How is the active principle affected by light?

It becomes yellow.

What is the dose of Levant wormseed?

15 to 50 grains.

What is the dose of the active principle?

One to two grains.

How would you distinguish Levant from American wormseed?

Rubbing the American seed between the fingers causes the small, black seeds to drop out, but simply reduces the Levant to a fine powder.

What is goldenseal?

The dried rhizome and roots of Hydrastis canadensis.

Give its official Latin name.

Hydrastis.

Name two alkaloids derived from it and describe them.

Hydrastine occurs in white, glistening prisms, permanent in the air, having a bitter taste and alkaline reaction.

Berberine: Minute yellow crystals, soluble in 100 parts of water.

From which of these alkaloids is an official artificial alkaloid derived and what is its name?

Hydrastine. It is used in making Hydrastinine hydrochloride.

Give its medicinal properties and use.

Hydrastinine hydrochloride is an oxytocic and is used in hemorrhages.

Give the medicinal properties of goldenseal and name its official preparations.

Alterative and tonic. Fluidextractum hydrastis, tinctura hydrastis, and glyceritum hydrastis.

What is elaterium and from what is it obtained?

A substance deposited by the juice of the fruit of Ecballium elaterium.

Describe it.

Elaterium is a yellowish-white, very fine powder, made by drying the juice of the fruit.

Give the medicinal properties and dose.

It is a purgative in one-eighth grain doses.

What is elaterin and from what is it obtained?

A neutral principle obtained from the juice of the fruit of Ecballium elaterium, hence obtained from elaterium.

Give its official Latin name and dose.

Elaterinum. Dose, one-tenth grain.

Why is it preferred to elaterium?

It is uniform in quality and strength and represents the drug activity.

What preparation of elaterin is official?

Trituratio elaterini.

What is henbane?

The dried leaves and flowering tops of Hyoscyamus niger.

Give its official Latin name.

Hyoscyamus.

What three alkaloidal salts derived from it are official?

Hyoscine hydrobromide, Hyoscyamine hydrobromide, and Hyoscyamine sulphate.

Which of them is most active? The most used?

Hyoscine hydrobromide.

Give its dose.

$^{1}/_{128}$ grain.

Give the medicinal properties of all the salts and doses of the other two.

Narcotic and sedative. Doses, $\frac{1}{128}$ grain.

Name the official preparations of henbane.

Extractum hyoscyami, fluidextractum hyoscyami, and tinctura hyoscyami.

Give the official Latin name of wildcherry, and state what part of the plant is official.

Prunus virginiana. The bark.

Give the botanical name of the plant from which the official product is obtained, also the family to which it belongs.

Prunus serotina. Family Rosaceæ.

Where does it grow and when should the official product be collected?

In the United States. Should be gathered in autumn.

Briefly describe the official product.

It occurs in curved pieces one to two inches long by one-eighth inch thick. Has a reddish-brown color and is brittle. Has a bitter astringent taste and aromatic odor.

Give the process for making syrup of wild cherry and

state why maceration is necessary and why it is made without heat.

The powdered bark is exhausted with a menstruum of glycerin and water, and the sugar dissolved by agitation. Maceration is necessary to dissolve the active ingredient, which only forms in presence of water, namely, hydrocyanic acid. Heat would volatilize the hydrocyanic acid.

Why is alcohol used as a component part of infusion of digitalis?

To prevent decomposition.

Why is aromatic sulphuric acid used to make infusion of cinchona, 1890?

To dissolve the alkaloids.

What is cocoanut?

The seed of Cocos nucifera.

What important commercial substance does it yield?

Cocoanut oil.

What is cacao?

The seeds of Theobroma cacao.

What is it chiefly used for?

To make chocolate, grinding the roasted seeds and mixing with sugar.

What important official substance is obtained from it?

Oleum theobromatis.

What is coca?

The leaves of Erythroxylon coca.

Give its Latin official name.

Coca.

State where it grows.

In the Andes Mountains.

Name its important alkaloid.

Cocaine.

What is benzoin and from what is it obtained?

A balsamic resin from Styrax benzoin.

Give name and family of the plant and state how the benzoin is obtained.

Styrax benzoin. Family Styraceæ. Incisions are made in the bark and fluid exudes, which later hardens.

Describe the familiar commercial variety, and name the official preparations into which it enters.

Benzoin occurs in pebble-like bodies, reddish-brown in color, and about one-quarter inch long and one-eighth inch thick. They are brittle, and the fresh surface is milk-white. Sweet odor and acrid taste, melting with heat. The official preparations are: Adeps benzoinatus, tinctura benzoini, tinctura benzoini composita.

What important official chemical is derived from benzoin and how?

Acidum benzoicum; by sublimation.

By what other method may this chemical be obtained?

By treating urine of cattle with lime in excess and adding hydrochloric acid to decompose the lime hippurate formed. Further addition of hydrochloric acid forms benzoic acid.

Into what pharmaceutical product does it enter?

Tinctura opii camphorata.

What varieties of rhamnus are official and where do they grow?

Rhamnus frangula and Rhamnus purshiana. They grow in California.

Name the official part of the plant used.

Bark.

What special directions are given as to the age and time of collection concerning one of these varieties?

Rhamnus purshiana should be one year old before using and should be gathered in the autumn. Rhamnus frangula should be at least one year old.

What other unofficial variety is used for making a syrup and what part of the plant is used for that purpose?

Rhamnus catharticus; berries.

Give the official Latin and common names of each.

Rhamnus purshiana—Cascara sagrada, chittem bark; and Rhamnus frangula—California buckthorn, buckthorn.

From what is olive oil obtained?

The ripe fruit of the olive.

Give the habitat and description of the plant.

The northern Mediterranean coast and California. The plant is a twenty-foot tree, having lanceolate, opposite leaves, entire and green above, the under surface hoary. The fruit is a one-seeded drupe having an oily flesh and hard seed.

How is the oil made?

By expressing the olives and clarifying the product.

What is meant by virgin oil?

It is the oil first expressed, having greater purity than subsequent oils.

What is the usual percentage of oil obtained?

60 to 70 per cent.

Describe the official oil and state what product of olive oil is official, and what official preparations are made from this product.

A pale yellow or light greenish-yellow oily liquid. Sapo is the official product of olive oil, and is used in emplastrum saponis and linimentum saponis.

Give tests for the reasonable purity of olive oil.

Shake equal volumes of olive oil and nitric acid; the liquid should not darken, and on standing six hours should form a yellow-white solid mass and an almost colorless liquid.

With what is olive oil frequently adulterated?

Cotton-seed oil.

Give the maximum single dose of each of the following:

Diluted hydrochloric acid	M. 30
Tincture of arnica	M. 15
Tincture of nux vomica	M. 15
Tincture of digitalis	M. 15
Tincture of belladonna	M. 10
Extract of opium	$\frac{1}{2}$ gr.
Morphia sulphate	$\frac{1}{4}$ gr.
Strychnia sulphate	$\frac{1}{20}$ gr.
Apomorphia hydrochloride	$\frac{1}{10}$ gr.
Atropia sulphate	$\frac{1}{60}$ gr.

Why should anthemis be collected from cultivated plants?

Because cultivation tends to form the so-called double flower—an increase of ray florets which contain more of the aromatic principles.

Why should the bark of Rhamnus Frangula be at least one year old before being used for pharmaceutical purposes?

When fresh it is emetic; when old it is purgative and tonic.

Why should the light spongy and white-colored nutgalls be rejected for pharmaceutical purposes?

Because of the small amount of tannic acid contained.

Why should colchicum root (corm) be collected from second year's growth, before the sprouting forth of the fall flowers, from the newly forming corms?

It then contains more of the active principle than if the corm was exhausted in the making of new plants.

Why should conium be gathered when still green, dried in the dark and kept unexposed in tight vessels?

Because of the extreme volatility of its alkaloid, coniine.

Why should digitalis leaves be collected in the second year's growth of the plant, and while in full bloom?

The leaves of the second year contain the greatest amount of active ingredient.

Why should belladonna leaves be collected from two-year old plants?

Because the plant is then at its perfection and contains the most alkaloid.

Why does the pharmacopoeia direct that the leaves and flowering tops of the second-year growth of hyoscyamus shall be collected?

The first year's growth has no stem and the leaves are less odorous. The greatest amount of activity is in second-year plants.

Black Haw: Give the botanical name, part employed and name the active constituents.

Viburnum prunifolium. Bark of root. Valeric acid and an acrid resin termed viburnin.

Jalap: Give botanical name, part employed, and name the active constituents.

Exogenium purga. Tuberous root. Convolvulin or jalapingin.

Lady's Slipper: Give botanical name, part employed and name active constituents.

Cypripedium hirsutum and Cypripedium parviflorum. Rhizome and root. Resin and volatile oil.

Burdock: Give botanical name, part employed and name of active constituents.

Arctium lappa and other species. Root. Bitter principle and inulin.

Chestnut: Give botanical name, part employed and name of active constituents.

Castanea dentata. Leaves. Tannin.

Give the official title of three organic drugs that are astringent, two that are demulcent.

Galla, hamamelis and gambir are astringent. Acacia and althæa are demulcent.

From what are the following obtained: (a) Sparteine, (b) emetine, (c) daturine, (d) eserine, (e) thymol.

(a) Scoparaius. (b) Ipecacuanha. (c) Stramonium. (d) Physostigma. (e) A phenol occurring in the volatile oil of Thymus vulgaris and other volatile oils.

Give the pharmacopoeial title of five organic acids.

Acidum benzoicum, acidum citricum, acidum tartaricum, acidum aceticum, acidum salicylicum.

What are glycerites? Name four official.

Glycerites are mixtures of medicinal substances with glycerin.

Glyceritum acidi tannici, glyceritum boroglycerini, glyceritum hydrastis, glyceritum phenolis.

To what class of substances do each of the following belong: (a) Kino, (b) myrrh, (c) tragacanth, (d) benzoin, (e) storax?

(a) Inspissated juice. (b) Gum resin. (c) Gummy exudate. (d) Balsamic resin. (e) Balsam.

Cramp Bark: Give (a) Natural order, (b) Latin official name, (c) botanic source, (d) part official, (e) constituents, (f) medicinal properties, (g) medicinal uses.

(a) Caprifoliaceæ. (b) Viburnum opulus. (c) Viburnum opulus. (d) The bark. (e) Valeric acid and bitter, resinous principle, viburnin. (f) Nervine, tonic, diuretic, astringent. (g) Antispasmodic, used in threatened abortion, dysmenorrhea and post-puerperal pains, diarrhœa and dysentery.

Give two examples with doses of (a) heart stimulant, (b) abortifacient, (c) cholagogue, (d) febrifuge, (e) an emmenagogue, (f) nephritic, (g) lenitive.

(a) Digitalis, gr. i; strophanthus, gr. i. (b) Ergota, 30 grs.; gossypium, 30 grs. (c) Euonymus, 15 grs.; leptandra, 7½ grs. (d) Cinchona, 15 grs.; acetanilidum, 4 grs. (e) Sabina, 7½ grs.; viburnum prunifolium, 30 grs. (f) Scoparius, 15 grs.; scillæ, 2 grs. (g) Oleum olivæ, 1 fl. oz.; manna, ½ oz.

Name the synonymns for each of the following: (a) arnica, (b) bryonia, (c) cascara sagrada, (d) caulophyllum, (e) colchicum, (f) dulcamara, (g) euonymus, (h) grindelia, (i) pareira, (j) phytolacca.

(a) Leopard's bane. (b) Bryony. (c) Chitem bark, buckthorn. (d) Blue cohosh. (e) Meadow saffron. (f) Bittersweet. (g) Wahoo. (h) Grindelia robusta. (i) Pareira brava. (j) Poke root.

From what plants are the following obtained? (a) iodine, (b) tannin, (c) tartaric acid, (d) pilocarpine, (e) hydrocyanic acid.

(a) From the residue of incinerating weeds. (b) Galla and a number of astringent drugs. (c) Argols, or tartar deposited in wine casks during vinous fermentation. (d) Pilocarpus. (e) Amygdala amara, Prunus virginiana.

Give the common name of (a) Fel bovis, (b) gossypium purificatum, (c) humulus, (d) hematoxylon, (e) krameria, (f) mel, (g) sapo mollis, (h) sassafras medulla, (i) castanea, (j) stillingia.

(a) Ox-gall. (b) Absorbent cotton. (c) Hops. (d) Logwood. (e) Rhatany. (f) Clarified honey. (g) Green soap. (h) Sassafras pith. (i) Chestnut. (j) Queen's root.

Name six official barks, giving official and common names.

(1) Cinchona; Peruvian bark. (2) Prunus virginiana; wildcherry. (3) Quercus; white-oak bark. (4) Rubus; blackberry. (5) Granatum; pomegranate. (6) Frangula; buckthorn.

Name two drugs belonging to each of the following families: (a) Umbilliferae, (b) rutaceae, (c) solanaceae, (d) urticaceae, (e) ranunculaceae, (f) rosaceae, (g) labiatae, (h) euphorbiacae, (i) coniferae, (j) loganiaceae.

(a) Asafœtida, anisum. (b) Limonis cortex, aurantii amari cortex (c) Belladonna, capsicum. (d) Humulus, cannabis indica. (e) Aconitum, cimicifuga. (f) Rosa gallica, rosa centifolia. (g) Mentha piperita, mentha viridis. (h) Stillingia, croton tiglium. (i) Terebinthina, terebinthina canadensis. (j) Nux vomica, gelsemium.

Give the common names for the following: (a) Rhus glabra, (b) Hyoscyamus, (c) Leptandra, (d) Frangula, (e) Pyroxylinum.

(a) Sumach. (b) Henbane. (c) Culver's root. (d) Buckthorn. (e) Gun-cotton.

Give in detail mode of preparation of (a) Oil of peppermint, (b) styrax.

(a) A volatile oil distilled from the fresh or partly dried leaves and flowering tops of peppermint, and rectified by steam distillation.

(b) The inner bark is steeped in hot water and the melted balsam is skimmed off and expressed from the bark.

Wahoo: Give botanical name, part employed and active constituents.

Euonymus atropurpureus. Bark of root. Resin, euonymin, euonic acid.

Elecampane: Give botanical name, part employed and active constituents.

Inula helenium. Root. Acrid resin, volatile oil and helenin.

Mandrake: Give botanical name, part employed, and active constituents.

Podophyllum peltatum. Rhizome. Picropodophyllin, podophyllotoxin, podophyllinic acid.

Catechu: Give botanical name, part employed and active constituents.

Gambir now replaces catechu.

Ourouparia gambir. Extract from the leaves and twigs. Catechutannic acid, catechin, and catechol.

Cubeb: Give botanical name, part employed and active constituents.

Piper cubeba. Dried, unripe fruit. Volatile oil, resin, cubebin and cubebic acid.

Conium: Give botanical name, part employed and active constituents.

Conium maculatum. Full-grown, unripe fruit. Coniine, conhydrine, methyl coniine with volatile oil.

Define and give example of each: (a) Sedative, (b) epispastic, (c) anthelmintic, (d) soporific, (e) hepatic.

(a) A remedy that allays activity or excitement. Belladonna.

(b) A blistering agent. Sinapis.

(c) An agent that expels or destroys worms. Santonin.

(d) Soporific is an agent that produces sleep. Opium.

(e) Relating to the liver. Hepatic drug is one that acts on the liver direct.

Aconite: Give the pharmacopoeial title, part employed and active constituents.

Aconitum. The dried, tuberous root. Aconite contains aconitine, picraconitine and aconitic acid.

Digitalis: Give the pharmacopoeial title, part employed and name of active constituents.

Digitalis. The leaves of the second year's growth. Its activity resides in five glucosidal principles which differ in their solubility—digitalin, digitalein, digitoxin, digitonin, and digitin.

Black Haw: Give the pharmacopoeial title, part employed, and name the active constituents.

Viburnum prunifolium. The dried bark of the root. Active principle valeric acid and a resinous principle viburnin.

Broom: Give the pharmacopoeial title, part employed and name the active constituents.

Scoparius. The dried tops. Active constituents: Sparteine, a liquid alkaloid, and a glucosidal principle called scoparin.

Kino: Give the pharmacopoeial title, part employed and active constituents.

Kino. The inspissated juice. Active constituent is kino-tannic acid.

Define the following terms: (a) Anodyne, (b) styptic, (c) drastic, (d) hydragogue, (e) hypnotic.

(a) An anodyne is a drug that allays pain.

(b) A styptic is a drug that arrests hemorrhage when applied locally.

(c) A drastic purgative is one that is strongly irritant to the intestines and occasions free transudation from its vessels and almost liquid stools.

(d) A hydragogue cathartic removes abundant serum from the intestinal vessels and produces large, watery stools.

(e) Hypnotic: This is a drug that produces sleep.

What are the active principles of the following drugs:

(a) Deadly night-shade, (b) fish berries, (c) quaker button, (d) calabar bean?

(a) Belladonna contains atropine, hyoscyamine and belladonnine.

(b) Cocculus indicus contains picrotoxin.

(c) Nux vomica contains strychnine, brucine, loganin, and igasuric acid.

(d) Physostigma contains physostigmine and calabarine, with a neutral principle physosterin.

Give the common names of the following drugs: (a) Caulophyllum, (b) euonymus, (c) phytolacca, (d) lappa, (e) illicium.

(a) Blue cohosh. (b) Wahoo. (c) Poke root. (d) Burdock. (e) Star anise.

Name (a) an inorganic corrosive acid, (b) an inorganic cauterizing acid, (c) an organic stringent acid, (d) an organic cathartic acid, (e) an inorganic emetic.

(a) Hydrochloric acid. (b) Glacial acetic acid. (c) Tannic acid. (d) Cathartic acid. (e) Zinc sulphate.

What are volatile oils, and give examples.

Volatile or essential oils are found in the various parts of the plant. They usually constitute the odorous principles, and they either pre-exist in the plant or are produced by the reaction of certain constituents when brought in contact with water.

Volatile oils are sometimes formed through destructive distillation, as the oil of amber; and they may also be obtained from the animal kingdom, as oil of ambergris.

They may be divided into four classes:

(1) Terpenes containing carbon and hydrogen, as oil of turpentine.

(2) Oxygenated hydrocarbons containing oxygen, as oil of cinnamon.

(3) Sulphurated, containing sulphur, as oil of mustard.

(4) Nitrogenated, containing hydrocyanic acid, like true oil of bitter almonds.

What are fixed oils? and give examples.

Fixed oils are obtained from both the vegetable and animal kingdom. They are greasy to the touch and leave a permanent greasy stain on paper. Chemically they are mixtures of olein, palmatin and stearin.

Examples are cotton-seed oil, olive oil, linseed oil.

Name an official mineral liquid.

Liquid petrolatum.

What is the official part of the following plants: (a) Cusso, (b) hedeoma, (c) gossypium, (d) eriodictyon, (e) cetraria?

(a) The dried pannicles of the pistillate flowers.
(b) The dried leaves and flowering tops.
(c) The hairs of the seeds and the dried bark of the root.
(d) The dried leaves.
(e) The seaweed.

From what are the following obtained: (a) Elaterin, (b) daturine, (c) berberine, (d) brucine, (e) chrysarobin?

(a) Elaterium.

(b) Daturine is the active principle of stramonium, and is a mixture of atropine and hyoscyamine.

(c) Berberine. This is an alkaloid found in several drugs, such as calumba, hydrastis and berberis.

(d) Brucine is one of the constituents of nux vomica.

(e) Chrysarobin is a neutral principle extracted from Goa powder, a substance found deposited in the wood of Vouacapoua araroba.

Give the pharmacopoeial title of five official seeds.

Pepo, physostigma, sinapis alba, sinapis nigra, nux vomica.

Name an acid obtained from a volatile oil.

Salicylic acid from oil of wintergreen.

Name an official trituration.

Trituratio elaterini.

Iris: Give common name, part employed and active constituents.

Blue flag. Rhizome and roots. It contains an acrid resin termed iridin.

Rumex: Give common name, part employed and active constituents.

Yellow dock. Root is used. It contains chrysophanic acid and tannin.

Crocus: Give common name, part employed and active principles.

Saffron. The stigmas. It contains polychroit, a glucoside which splits into crocin, and glucose.

Sanguinaria: Give common name, part employed and active constituents.

Blood root. The dried rhizome. It contains sanguinarine, a colorless alkaloid, which yields bright red salts.

Cimicifuga: Give the common name, part employed and active constituents.

Black cohosh or black snake root. Rhizome and roots. Its activity is due to a resin termed cimicifugin or macrotin.

Give the source of the following: (a) Strychnine, (b) creosote, (c) iodine, (d) citric acid, (e) tannic acid, (f) oleic acid, (g) oxalic acid, (h) gallic acid.

(a) Nux vomica. (b) Beech wood. (c) Kelp and residue from Chili saltpetre beds. (d) Limes and lemons. (e) Galls or nut-galls. (f) By-product in the manufacture of tallow candles. (g) By acting on cellulose, sugar or starch with nitric acid. (h) Nut-galls.

Give the official title of five drugs that contain a volatile oil.

Cubeba, capsicum, buchu, valeriana, sabina.

Name the official preparations that contain a free or uncombined element.

Liquor chlori compositus, calx chlorinata, liquor sodae chlorinatae, tinctura iodi, liquor iodi compositus.

Give the pharmacopoeial title of the following: (a) Thorn apple, (b) golden seal, (c) wormwood, (d) wild cherry, (e) poison hemlock.

(a) Stramonium. (b) Hydrastis. (c) Absinthium. (d) Prunus virginiana. (e) Conium.

Ipecac: Give botanical name, part employed and name the active constituents.

Cephaelis ipecacuanha. The dried root. Ipecac contains emetine, cephaeline, and psychotrine with ipecacuanhic acid.

Rhubarb: Give the botanical name, part employed and name the active constituents.

Rheum officinale, Rheum palmatum, and the variety Tanguticum, with other species grown in China and Thibet. The dried rhizome. Active constituents. Neutral principles are chrysophanic acid, rhein and rhabarberon; astringent principles are rheotannic acid and rheumic acid. Four resins or cathartic principles: erythroretin, phaeoretin, aporetin, and emodin.

Henbane: Give the botanical name, part employed and the active constituents.

Hyoscyamus niger. The leaves and the flowering tops of the second year's growth. Active principles: Hyoscyamine, hyoscypicrin, and the derivative hyoscine.

Yerba Santa: Give botanical name, part employed and name the active constituents.

Eriodictyon californicum. The dried leaves. It contains a bitter resin and volatile oil.

Dandelion: Give the botanical name, part employed and name the active constituents.

Taraxacum officinale. The dried root. It contains an acrid, crystalline principle taraxacin and resin.

Jaborandi: Give the botanical name, part employed and name the active constituents.

Pilocarpus jaborandi and Pilocarpus microphyllus. The leaflets. It contains two alkaloids, pilocarpine and jaborine, with a volatile oil.

Name the official part or parts of the following plants: (a) Colocynth, (b) phytolacca, (c) stramonium, (d) bryonia, (e) barosma betulina.

(a) The peeled dried fruit. (b) The dried root. (c) The dried leaves. (d) The root (no longer official). (e) The dried leaves.

To what class of substances do each of the following belong: (a) Asafoetida, (b) acacia, (c) sparteine, (d) copaiba, (e) storax.

(a) Gum resin. (b) Gummy exudate. (c) Alkaloid. (d) Oleoresin. (e) Balsam.

Give the pharmacopoeial title of the following: (a) Monkshood, (b) calabar bean, (c) blue flag, (d) thorn-apple, (e) bitter apple.

(a) Aconitum. (b) Physostigma. (c) Iris. (d) Stramonium. (e) Colocynthis.

Give the official title of a drug that belongs to each of the following classes: (a) Alkaloids, (b) gums, (c) oleoresin, (d) resin, (e) gum resin.

(a) Strychnina. (b) Tragacantha. (c) Copaiba. (d) Guaiacum. (e) Myrrha.

Define and give an example of each: (a) Sedative, (b) epispastic, (c) anthelmintic, (d) soporific, (e) hepatic.

(a) A remedy that allays activity or excitement. Belladonna.

(b) A blistering agent. Sinapis.

(c) An agent that expels or destroys worms. Santonin.

(d) An agent that produces sleep. Opium.

(e) Relating to the liver. Hepatic drug is one that acts on the liver directly.

Give common names of the following: (a) apocynum, (b) jasmine, (c) capsicum, (d) barosma, (e) lobelia.

(a) Dog-bane or Canadian hemp. (b) Gelsemium. (c) Cayenne or African pepper. (d) Buchu. (e) Indian tobacco.

Give U. S. Pharmacopoeial title of five fruits.

Humulus, ficus, rhus glabra, cubeba, piper.

Name three official preparations containing white wax.

Unguentum aqua rosae, ceratum, ceratum camphorae.

From what is gum benzoin obtained? Give U. S. Pharmacopoeial preparations into which it enters.

A balsamic resin obtained from styrax benzoin and another unidentified species, styraceæ.

Adeps benzoinatus, tinctura benzoini, tinctura benzoini composita.

Name an official volatile oil obtained by (a) distillation, (b) expression, (c) maceration and subsequent distillation, (d) from the fruit.

(a) Oleum rosmarini. (b) Oleum aurantii corticis. (c) Oleum amygdalae amarae. (d) Oleum anisi.

Name two official preparations of gum opium. Give percentage of morphine contained in each.

Opii pulvis; 12 to 12½ per cent. morphine.

Opium granulatum; 12 to 12½ per cent. morphine.

Name official source of (a) Burgundy pitch, (b) cacao butter, (c) sassafras pith, (d) matico leaves, (e) lily of the valley.

(a) The prepared resinous exudation of abies excelsa (U. S. P. 1890). (b) A fixed oil expressed from the roasted seeds of Theobroma cacao. (c) The dried pith of Sassafras variifolium. (d) The leaves of Piper angustifolium. (e) The dried rhizome and roots of Convallaria majalis.

ALOE.

(1) Give the official and botanical names, habitat, natural order and constituents.

(2) Name all the commercial varieties.

(3) In what form is aloes used in official preparations.

(4) From which form is this kind prepared.

(5) State medical properties and use.

(6) What active principle is obtained from them and which variety yields it most abundantly?

(1) Official name of both varieties is now aloe. In 1890 there were two varieties, as follows: Aloe barbadensis, Aloe socotrina.

The inspissated juice of the leaves of Aloe vera, Aloe chinensis, and Aloe perryi, or other species of Aloe.

Eastern and Southern Africa for Barbadoes, Socotrina and Cape. Other varieties from India and northeastern Africa.

Family or order Liliaceæ. It contains aloin, emodin, a trace of volatile oil, and resin.

(2) Socotrine, Barbadoes, Natal and Cape.

(3) Purified aloes.

(4) From the official aloe (Barbadoes and Socotrine).

(5) It is cathartic and emmenagogue, and used in various laxative pills combined with proper agents to prevent griping.

(6) Aloin, named according to variety, thus: Socaloin, from the Socotrine; Barbaloin, from the Barbadoes; and Nataloin, from the Natal variety. Barbadoes or Curaçoa aloes yield it most abundantly.

ERGOTA.

(1) Give the name of the fungus producing it and the plant upon which it grows.

(2) Why is this drug used as a haemostatic and upon what organ does it principally act?

(3) Why is its indiscriminate sale reprehensible?

(1) Sclerotium of Claviceps purpurea (family Hypocrea-

ceæ) replacing the grain of rye, Secale cereale (family Graminæ).

(2) On account of its power to contract muscular tissue. It acts chiefly upon the uterus.

(3) It may be used for criminal purposes.

BETULA.

(1) State what synthetic chemical is identical with the volatile oil obtained by distillation from the bark.

(2) With what other volatile oil is it nearly identical and what is the difference between them?

(3) State their medicinal properties.

(1) Methyl salicylate.

(2) Oil of gaultheria.

(3) Oil of betula is optically inactive, while oil of gualtheria is slightly lævogyrate; otherwise they are identically the same. They are used as flavoring agents, and in place of salicylic acid in rheumatism, neuralgia and kindred diseases.

Define the following terms, giving an example of each: (1) Diuretic, (2) vesicant, (3) anthelmintic, (4) haemostatic, (5) anesthetic, (6) sialagogue, (7) emmenagogue, (8) cholagogue, (9) carminative, (10) diaphoretic.

(1) A drug that stimulates the secretion of urine. Copaiba.

(2) A drug that blisters. Cantharis.

(3) A drug that expels or destroys worms. Santonica.

(4) A drug that arrests hemorrhage. Ergota.

(5) A drug that produces a state of unconsciousness. Ether.

(6) A drug that increases salivary flow. Pilocarpus.

(7) A drug that stimulates the menstrual flow. Aloe.

(8) A drug that increases the flow of bile. Euonymus.

(9) A drug that expels flatus. Mentha piperita.

(10) A drug that produces sweating. Pulvis ipecacuanhæ et opii.

Name five potassium salts, giving their medicinal properties and doses of each.

Potassii iodidum.	Alterative.	7½ grains.
Potassii bitartras.	Diuretic.	30 grains.
Potassii bicarbonas.	Antacid.	30 grains.
Potassii bromidum.	Nervine.	15 grains.
Potassii et sodii tartras.	Purgative.	120 grains.

CINCHONA.

(1) Give the official and botanical names of the two official barks.

(2) From whence do we now receive the best quality, and how has our source of supply been to a great extent changed?

(3) State the percentage of total alkaloids required by our pharmacopoeia.

(4) State the various alkaloids obtained therefrom, and which is of the most importance.

(5) Name the preparations of cinchona, stating the variety used in each.

(6) What are the medical properties and uses?

(1) Cinchona. The dried bark of Cinchona ledgeriana. Cinchona calisaya, Cinchona officinalis, and of hybrids of these with other species of cinchona.

Cinchona rubra. The dried bark of Cinchona succirubra or of its hybrids.

(2) From the East Indies. Formerly from Peru and Bolivia, but owing to crude methods formerly employed in its collection no provisions were made for its future cultivation until recently.

(3) It should yield not less than 5% of total anhydrous cinchona alkaloids.

(4) It contains in all twenty alkaloids, only six of which are important, viz.: quinine, quinidine, quinicine, cinchonine, cinchonidine, cinchonicine. Quinine is the most important.

(5) From cinchona: Fluidextractum cinchonae, tinctura

cinchonae. From red cinchona: Tinctura cinchonae composita.

(6) It is a febrifuge, tonic, antiseptic and astringent.

ACETANILID.

(1) State its source and mode of preparation.

(2) What are its characteristics?

(3) What is its chief medical property, and why should its indiscriminate uses be discouraged?

(4) In what class of preparations is it the principal ingredient?

(1) It is the monacetyl derivative of aniline, and is made by heating a mixture of aniline oil and glacial acetic acid to the boiling-point; the cooled residue is purified by sublimation or recrystallization.

(2) Colorless, shining, micaceous, crystalline laminae, or a crystalline powder, permanent in the air.

(3) It is an antipyretic and a heart depressant, hence should be used with caution.

(4) In various popular headache remedies.

Give the official and common names and parts used of the drugs derived from the following sources, viz.: (1) Gadus Morrhua, (2) Physeter Macrocephalus, (3) Bos Taurus, (4) Sus Scrofa, (5) Avis Aries.

(1) Oleum morrhuae, oleum jecoris aselli. A fixed oil from the fresh livers.

(2) Cetaceum, spermaceti. A peculiar concrete, fatty substance obtained from the head.

(3) Fel bovis, ox-gall. The fresh bile.

(4) Adeps, lard. The prepared internal fat of the abdomen.

(5) Adeps lanae, or wool fat, and Sevum praeparatum, or prepared suet. The former being the purified fat of the wool, the latter the internal fat of the abdomen.

DIGESTIVE FERMENTS.

(1) Name two digestive ferments.

(2) The animal and part of the animal from which each is derived.

(3) The kinds of food upon which they act, and the part of the intestinal tract in which this action takes place.

(4) What can be prescribed with each to increase its efficiency?

(1) Pepsin, pancreatin.

(2) Pepsin from the glandular layer of the fresh stomach of the hog (Sus scrofa, var. Domesticus). Pancreatin, from the pancreas of warm-blooded animals, usually from the hog or the ox (bos taurus).

(3) Pepsin acts as a proteolytic ferment and acts in the stomach. Pancreatin digests albuminoids and converts starch into sugar, dextrin or maltose, and acts in the intestines.

(4) Dilute acids with pepsin, alkalies with pancreatin.

DIGITALIS.

(1) From where do we obtain it?

(2) When is it to be collected?

(3) Name official preparations?

(4) What are its medicinal properties?

(1) The dried leaves of Digitalis purpurea (family Scrophulariaceæ).

(2) From plants of the second year's growth at the commencement of flowering.

(3) Infusum digitalis, fluidextractum digitalis, extractum digitalis, tinctura digitalis.

(4) Vascular stimulant and diuretic.

Give official names of (1) Cream of tartar, (2) rochelle salts, (3) elder flowers, (4) henbane, (5) German chamomile.

(1) Potassii bitartras. (2) Potassii et sodii tartras. (3) Sambucus. (4) Hyoscyamus. (5) Matricaria.

Give botanical name and part of the plant used of the following: Thoroughwort, wahoo, saffron.

Thoroughwort, the dried leaves and flowering tops of Eupatorium perfoliatum.

Wahoo, the dried bark of the root of Euonymus atropurpureus.

Saffron, the stigmas of Crocus sativus.

Which contains the greater amount of digitalin, the leaves or the seeds of digitalis? Which is official?

The seeds contain the most. The leaves are official.

How and from what is manna obtained?

Manna is the concrete saccharine exudation of Fraxinus ornus, and it is obtained by making transverse incisions in the bark, and the exuding juice is allowed to harden on the tree or on tiles.

Name and describe the official products from the class pisces.

Oleum morrhuae; a pale yellow, thin, oily liquid. This is the only official product of this class.

To what does cochineal owe its red color?

Carminic acid.

What important official substance is obtained from bladderwrack?

Iodine.

LYCOPODIUM.

What is it, and from what obtained? What acid is found combined with it?

The spores of Lycopodium clavatum, or other species of Lycopodium.

Oleic acid, $C_{16}H_{30}O_2$.

What fly found in the United States was formerly re-

cognized by the Pharmacopoeia as a substitute for cantharides?

Cantharis vittata, or potato fly.

To what order does the plant from which oil of savin is obtained belong? Name all other official products of this family.

Coniferæ. Oleum juniperi, Terebinthina, Terebinthina canadensis.

BITTER APPLE.

Give botanical name, part employed and name the active constituents.

Citrullus colocynthis. Peeled dried fruit. It contains colocynthin and colocynthitin.

THORN APPLE.

Give botanical name, part employed and name the active constituents.

Datura stramonium. The dried leaves. It contains daturine, which is a mixture of atropine and hyoscyamine.

Give the official title of a drug that belongs to each of the following classes: (a) Gum resin, (b) oleo-resin, (c) gum, (d) balsam, (e) resin.

(a) Myrrha. (b) Copaiba. (c) Acacia. (d) Balsamum tolutanum. (e) Guaiacum.

From what is creosotum derived? What is the source from which phenic acid is obtained?

By the distillation of wood tar, preferably of that derived from the beech. Fagus silvatica or Fagus ferruginea.

Phenic acid (phenol, U. S. P.) is obtained from coal tar by fractional distillation, or made synthetically.

Give the official title of five vegetable drugs, three mineral and two animal drugs.

Vegetable—Belladonna, nux vomica, opium, digitalis, hyoscyamus. *Mineral*—Hydrargyrum, zincum, ferrum. *Animal*—Moschus, fel bovis.

From what drug are the following alkaloids obtained: (a) Emetine, (b) strychnine, (c) eserine, (d) atropine, (e) codeine?

(a) Ipecac. (b) Nux vomica. (c) Physostigma. (d) Belladonna. (e) Opium.

Give the common names of the following: (a) Taraxacum, (b) althaea, (c) anthemis, (d) phytolacca, (e) pilocarpus.

(a) Dandelion. (b) Marshmallow. (c) Chamomile. (d) Poke root. (e) Jaborandi.

What is asafoetida? What impurities does it contain? What appearance should good asafoetida have?

A gum resin obtained from the root of Ferula foetida and other species. It always contains vegetable fragments and earthy impurities, such as calcium sulphate and carbonate. It should be yellowish-white and translucent, or milky-white and opaque, gradually changing to pinkish, and finally reddish-brown.

What is camphor?

The dextrogyrate modification of the saturated ketone obtained from Cinnamomum camphora.

From what and how is castor oil made?

A fixed oil expressed from the seed of Ricinus communis. The best grade by cold expression.

What is cusso?

The dried pannicles of the pistillate flowers of Hagenia abyssinica.

What is elaterium?

A substance deposited by the juice of the fruit of Ecballium elaterium.

Describe the best elaterium?

When the fruit of the squirting cucumber is sliced and placed upon a sieve a perfectly limpid and colorless juice flows out, which soon becomes turbid, and in the course of a few hours deposits a sediment. This when collected and dried is very light and pulverulent, of a yellowish-white color tinged with green.

What are galls? Describe the best kind of galls.

An excrescence on Quercus infectoria caused by the punctures and deposited ova of Cynips tinctoria. Subglobular, 1 to 2 Cm. in diameter, externally blackish, olive-green or blackish-gray, more or less tuberculated above, the basal portion nearly smooth and contracted into a short stalk, sometimes with a perforation on one side, fracture horny, yellowish or grayish in the center, a cavity containing either the partly developed insect or pulverulent remains of it.

What is guarana?

A dried paste consisting chiefly of the crushed seeds of Paullinia cupana.

What is gelatin?

The purified, air-dried product of the hydrolysis of certain animal tissues, as skin, ligaments and bones, by treatment with boiling water.

What is isinglass?

The swimming bladder of Acipenser huso, class Pisces.

What are the adulterations of lycopodium and how are they detected?

Pollen or starch grains, detected by microscopical examination; also the ash upon ignition should not exceed 5%.

What is the official name of lily of the valley? And the name of the official preparation?

Convallaria. Fluidextractum convallariae.

Give the common name of cannabis indica? What part of the plant is used?

Indian hemp. Flowering tops.

What is xanthoxylum? Give the medical properties?

The dried bark of Xanthoxylum americanum or of Fagara clava-herculis. Sialagogue, alterative and stimulant.

CONIUM.

Give common name and part used.

Poison hemlock. Full-grown but unripe fruit.

Give two examples each of stimulant and refrigerant?

Stimulant, alcohol and ammonia; refrigerants, water and diluted acids.

How would you distinguish uva ursi from buchu leaves?

By odor and appearance. Buchu has crenate or serrate margin with oil glands at the base of each tooth, readily seen by holding to the light. Uva ursi has smooth margin and no oil glands.

Name two vegetable astringents, giving the parts of the plant used.

Quercus. The bark.
Rhus glabra. The fruit.

AURUM.

What is it? What preparation of it is used and what are its medicinal properties?

Aurum is the Latin name for gold. The preparation used is auri et sodii chloridum. Used as an alterative.

HAEMATOXYLON.

Give the common name? What acid does it contain?

Logwood. Tannic acid.

What is naphthalin. What are its medicinal uses?

Now official as naphthalenum. Is a hydrocarbon obtained from coal-tar and purified by crystallization. Used chiefly as an insecticide; rarely internally as an antiseptic.

What are the physiological properties of the salts of zinc?

They are chiefly astringent.

What are demulcents? Name two demulcents.

Demulcents are bland substances used to protect mechanically the gastro-intestinal tract.
Acacia, flaxseed.

Give the full name of coca and name the official preparations?

Coca. Fluidextractum cocae, vinum cocae.

Which of the following alkaloids are official: Aconitina, atropina, pilocarpina, emetina and hyoscina?

All except emetina.

Give the common name and part used of phytolacca.

Poke root. The root.

What is the official name of buckthorn? What is its medicinal use?

Frangula. When fresh, emetic; when old, tonic, purgative and diuretic.

Name three emollients? Explain their use.

Lard, glycerin, starch. They protect the surface to which they are applied from friction and the air.

GELSEMIUM.

Give common name and part used.

Yellow jasmine. Rhizome and roots.

CHONDRUS.

Where is it obtained? What are its medicinal properties?

Atlantic Ocean. Demulcent, nutrient.

What alkaloid is obtained from scoparius? Describe it.

Sparteine, a colorless liquid. Official as Sparteinæ sulphas in colorless, rhombohedral crystals or a crystalline powder.

Name the official decoctions? Why are decoctions not desirable preparations?

All decoctions were dismissed from the last Pharmacopœia. They do not keep well.

CETRARIA.

What is it? Where is it obtained. For what is it used?

It is a lichen. Cetraria islandica. Northern Hemisphere. Used as demulcent and nutrient.

Give the common names of guaiacum, colchicum, veratrum?

Lignum vitae, meadow saffron, American hellebore.

What are the medicinal properties of cod liver oil?

It is haematinic, tonic, nutrient, demulcent.

What is the average dose of the dilute mineral acids?

Ten minims.

What is the strength of the dilute mineral acids, except acidum nitrohydrochloricum dilutum?

Ten per cent.

Name three vegetable diaphoretics and give the adult dose of each.

Pulvis ipecacuanhae et opii, 10 grains; sulphur, 60 grains; pilocarpus, 30 grains.

What is the official name of May-apple, the part used and active principle?

Podophyllum. The dried rhizome. Active principles are picropodophyllin, podophyllotoxin, and podophyllinic acid.

From what is menthol obtained, and what is its use in medicine?

A secondary alcohol obtained from the oil of mentha piperita. It is used as a local remedy in neuralgia and headache.

Give the common name and medicinal properties of sanguinaria.

Bloodroot. Is alterative, sternutatory, stimulant and emetic.

What are haematinics? Name two.

Haematinics are drugs or agents which improve the quality and composition of the blood. Iron and manganese.

SCILLA.

Describe it and give the medical properties?

It is the bulb deprived of its dry membranaceous outer scales, cut into thin slices and carefully dried, the central portions being rejected. It occurs in irregular, somewhat translucent, yellowish-white or reddish-white segments.

It is expectorant, emetic and diuretic.

EUCALYPTUS.

What is the common name and what parts are used?

Blue gum tree. The dried leaves.

How is benzoic acid obtained?

From benzoin by sublimation or prepared artificially.

Name the official preparations of aconite, lobelia and lactucarium?

Fluidextractum aconiti, fluidextractum lobeliae, tinctura lactucarii, tinctura aconiti, tinctura lobeliae, syrupus lactucarii.

(1) What is gossypium?

(2) What plant is it derived from and where does it grow?

(3) What parts of the plant are official?

(4) How is gossypium purified?

(5) What is the soluble form of gossypium called and how is it prepared?

(1) The hairs of the seeds of Gossypium herbaceum or other cultivated species.

(2) Gossypium herbaceum. Southern United States.

(3) The hairs of the seed and the bark of the root and an oil from the seeds.

(4) It is first freed from fatty matter by boiling in weak alkaline solution, rinsing in a weak solution of chlorinated lime to whiten it, dipping in dilute HCl, and then rinsing in water and carding.

(5) Pyroxylin, prepared by treating the cotton with nitric and sulphuric acids, and then it is soluble in a mixture of one part alcohol, three parts ether.

(1) What is the official hydrastis?

(2) Give American name, natural order and habitat?

(3) Give its properties and uses?

(4) What official preparations are made from it?

(5) What is the drug strength of each?

(1) The dried rhizome and roots of Hydrastis canadensis yielding not less than 2.5% of hydrastine.

(2) Goldenseal. Ranunculaceæ. North America.

(3) It is alterative, tonic and astringent.

(4) Fluidextractum hydrastis, 1 Gm. = 1 C.c. Tinctura hydrastis, 20 per cent. Glyceritum hydrastis, 1 Gm. = 1 C.c.

(1) Give the natural order of coca?

(2) Give the American official name and habitat.

(3) What official preparations are made from it?

(4) What valuable alkaloid is derived from it?

(5) What are its uses and abuses?

(1) Erythroxylaceæ.

(2) Coca. Peru and Bolivia.

(3) Fluidextractum cocae.

(4) Cocaine.

(5) Local anesthetic and cerebral stimulant. Danger of becoming habituated to its use.

(1) What is a toxin?

(2) What is an antitoxin?

(3) Define serum?

(4) What is antistreptococci serum used for and what is the dose?

(5) What is the dose of antidiphtheritic serum as directed by the U. S. Pharmacopoeia, 8th Revision.

(6) What is the immunizing dose as directed by the same authority?

(1) By toxin we mean the poisonous principle which is developed as a result of the growth and development of pathogenic micro-organisms.

(2) Antitoxin is the principle that develops in an animal which has received toxin in proper proportions, that neutralizes the poisonous effect of the toxin.

(3) By serum we mean the serous or liquid portions of the blood which separates from the coagulum on standing.

(4) It is used in septic conditions and certain malignant growths. Dose 5 to 30 minims injected hypodermatically, usually once daily, until reactionary effect is produced.

(5) 3000 units.

(6) 500 units.

These doses must, of course, be modified to suit the particular case, as often larger doses are required.

WOOL FAT.

(1) Give the Latin official names for the two official wool fats.

(2) What is the difference between the two?

(3) Describe the two preparations.

(4) At what temperature do they melt?

(5) Wool fats form one of the ingredients of seven important pharmaceutical preparations. Mention some of them and the kind of wool fat employed in each.

(1) Adeps lanae, adeps lanae hydrosus.

(2) The hydrous form contains not more than 30% of water added to it.

(3) Wool-fat is a light yellowish, tenacious, unctuous mass. Hydrous wool-fat is a yellowish-white or nearly white ointment-like mass.

(4) They both melt at 40° C.

(5) Wool-fat is used in the ceratum plumbi subacetatis; hydrous wool-fat in emplastrum hydrargyri, unguentum belladonnae, unguentum hydrargyri ammoniati, unguentum hydrargyri oxidi flavi, unguentum hydrargyri oxidi rubri, unguentum stramonii.

AMYL NITRITE.

(1) Give the official Latin name.

(2) What is it chemically and what is its chemical formula?

(3) Describe it and state how it should be kept.

(4) What are its properties and uses?

(5) Give the dose for internal use and for inhalations.

(1) Amylis nitris.

(2) It contains about 80 per cent of amyl (chiefly isoamyl) nitrite ($C_5H_{11}NO_2$).

(3) A clear, yellowish liquid with a peculiar ethereal fruity odor and a pungent, aromatic taste. It should be kept in hermetically-sealed glass bulbs, or in dark amber-colored, glass-stoppered vials, in a cool and dark place.

(4) It is a stimulant, and it is used in asthma, angina pectoris, and similar conditions, both internally and by inhalation.

(5) Internally, 3 minims; by inhalation, 5 or 10 minims.

CRESOL.

(1) What is cresol?

(2) Describe it.

(3) How should it be kept.

(4) What are its medicinal properties and uses?

(5) What important official antiseptic and disinfectant fluid is made from it?

(6) Under what other commercial name are similar disinfectants frequently called?

(1) A mixture of the three isomeric cresols obtained from wood tar freed from phenol hydrocarbons and water.

(2) A colorless or straw-colored refractive liquid turning yellowish-brown on long exposure to light. It possesses a phenol-like odor.

(3) It should be kept in amber-colored bottles protected from light.

(4) It is antiseptic and disinfectant, resembling phenol in its medicinal properties, but owing to its greater insolubility in water it is nearly always employed in combination with alkalies, associated with fatty bodies or soaps.

(5) Liquor cresolis compositus.

(6) Lysol, creolin, solveol, and solutol.

Give the official Latin name and average dose of the following drugs: (1) Corrosive sublimate, (2) sugar of lead, (3) codeine sulphate, (4) cocaine hydrochloride, (5) chloralformamide, (6) betanaphthol, (7) guaiacol, (8) iodoform, (9) iodol, (10) sodium arsenate.

(1) Hydrargyri chloridum corrosivum, $^1/_{20}$ grain. (2) Plumbi acetas, 1 grain. (3) Codeinae sulphas, ½ grain. (4) Cocainae hydrochloridum, ½ grain. (5) Chloralformamidum, 15 grains. (6) Betanaphthol, 4 grains. (7) Guaiacol, 8 minims. (8) Iodoform, 4 grains. (9) Iodolum, 4 grains. (10) Sodii arsenas, $^1/_{10}$ grain.

FORMALDEHYDE.

(1) In what form is this official in the 8th Revision of the U. S. Pharmacopoeia?

(2) How much absolute formaldehyde by weight is it required to contain?

(3) What is it the product of, describe it?

(4) What are its medicinal properties and uses?

(5) What is it often used for unlawfully?

(6) Mention the best known antidote for its poisonous effect?

(1) Liquor formaldehydi.

(2) Not less than 37%.

(3) An oxidation product of methyl alcohol, a clear, colorless liquid. Its vapor acts as an irritant to the mucous membranes, pungent odor, caustic taste, neutral or faintly acid reaction.

(4) Antiseptic and antiferment; used for disinfecting apartments after contagious diseases.

(5) To preserve milk and meat and all foods liable to ferment on standing.

(6) Solution of ammonium acetate internally. Ammonia by inhalation.

Give the botanical names of the following drugs: (1) Wormwood, (2) pleurisy root, (3) calamus, (4) blue cohosh, (5) Irish moss, (6) Iceland moss, (7) pumpkin seed, (8) poke root, (9) wild cherry, (10) blackberry.

(1) Artemisia absinthium. (2) Asclepias tuberosa. (3) Acorus calamus. (4) Caulophyllum thalictroides. (5) Chondrus crispus. (6) Cetraria islandica. (7) Cucurbita pepo. (8) Phytolacca decandra. (9) Prunus serotina. (10) Rubus villosus, rubus nigrobaccus, or rubus cuneifolius.

STROPHANTHUS.

(1) Give the name and character of the plant from which it is derived?

(2) Give its habitat?

(3) Name the official preparation made from it?

(4) What part of the plant is used?

(5) Give its medicinal properties and uses?

(1) The ripe seeds of Strophanthus kombe deprived of its long awn. It is a shrub, and the seeds are sent into the market deprived of the awns, but are sometimes imported in the follicles, which are 20 to 30 Cm. long.

(2) Tropical Africa.

(3) Tinctura strophanthi.

(4) The seed.

(5) It is used as a cardiac stimulant and general sedative.

COPAIBA.

(1) What is it and from what is it derived?

(2) Describe it and state from what countries it is chiefly obtained.

(3) There are four commercial varieties—which of them is esteemed the best and why?

(4) Describe massa copaibae and state how it is made.

(5) What is resina copaiba and how is it obtained? Describe it.

(6) Give medical properties and uses.

(1) An oleoresin from one or more South American species of copaiba.

(2) A pale yellow, more or less transparent and viscid liquid, sometimes fluorescent, peculiar aromatic odor and persistent, bitter, acrid taste. From Para in Brazil, Maracaibo in Venezuela, and other South American ports.

(3) Para copaiba, as it yields largest amount of volatile oil, 60 to 90 per cent. Maranham and Rio Janerio, 40 to 60 per cent. Maracaibo, 20 to 40 per cent.

(4) This is magnesium copaivate, and is made by mixing 6 parts of magnesia with 94 parts of copaiba. It is of pilular consistence.

(5) The residue left after distilling copaiba. A yellowish or brownish-yellow brittle resin.

(6) Stimulant and diuretic.

CANTHARIS.

(1) Describe them?

(2) From what countries are they obtained?

(3) How are they collected and prepared for the market?

(4) What official preparations are made from them?

(5) What important change has been made in one of these preparations according to the 8th Revision of the U. S. P.?

(1) 18 to 25 Mm. long, about 6 Mm. broad; flatish, cylindrical, black in the upper part, with two long wing sheaths, and ample, transparent, membranous, brownish wings, elsewhere of a shining coppery-green color, odor strong and disagreeable, taste acrid.

(2) Southern and Central Europe.

(3) By shaking the tree or shrub or beating the branches in the morning and killing the insects with hot water, or after placing them in a well-closed vessel with oil of turpentine, carbon disulphide, or ammonia.

(4) Ceratum cantharidis, collodium cantharidatum, tinctura cantharidis.

(5) The cerate is now prepared with liquid petrolatum as the solvent instead of oil of turpentine. The tincture is now 10 per cent, formerly 5 per cent.

CAMPHOR.

(1) What is camphor? Describe it.

(2) From what is it derived and how?

(3) From what countries is it obtained?

(4) Into what official preparations does it enter?

(5) Give the percentage in each?

(6) What are its properties and uses, and what is the dose of camphor?

(1) The dextrogyrate modification of the saturated ketone from the camphor tree. It occurs in white, translucent masses of a tough consistence and a crystalline structure,

penetrating characteristic odor and pungent, aromatic taste.

(2) It is prepared from the crude granular camphor by sublimation.

(3) Japan and China.

(4) Aqua camphorae, 0.8%; ceratum camphorae, 2%; linimentum camphorae, 20%; spiritus camphorae, 10%.

(6) It is a stimulant and antispasmodic carminative. Dose, 2 grains.

ICHTHYOL.

(1) What is it?
(2) Give its synonym?
(3) Describe it?
(4) What are its medicinal properties?
(5) Give dose for internal use.

(1) A substance obtained from a brownish mineral containing animal residue of fish found in Sufeld and Tyrol, purified by distillation and treatment with sulphuric acid.

(2) Ammonium icythyol-sulphonate.

(3) A thick, brown, tarry liquid with bituminous odor.

(4) Antiphlogistic, antiseptic, alterative, and used in skin diseases.

(5) 10 to 15 grains.

Give the official Latin name and the part used of the drugs obtained from the following: (1) Picraena excelsa, (2) rhus radicans, (3) smilax officinalis, (4) urginea maritima, (5) ovis aries, (6) asagraea officinalis, (7) vitis vinifera, (8) gallus bankiva, (9) zea mays, (10) claviceps purpurea.

(1) Quassia, the wood. (2) Rhus toxicodendron, the fresh leaves. (3) Sarsaparilla, the root. (4) Scilla, the bulb. (5) Adeps lanae and sevum praeparatum, the fat of the wool and the internal fat of the abdomen. (6) Veratrine, a mixture of alkaloids. (7) Vinum rubrum and vinum album, the fermented juice of the fruit. (8) Vitellus, the yolk of

egg. (9) Amylum, starch grains from the fruit. (10) Ergota, the sclerotium.

Give the characteristics by which you would distinguish: (1) couch grass from bitter sweet.

Couch grass tastes sweet; bitter sweet tastes bitter, afterwards sweet. Couch grass stains yellow; bitter sweet, greenish-brown, and with the microscope the structural appearance is quite different.

(2) Aconite from gentian.

By taste, physical appearance and microscopical examination of structure.

(3) Anthemis from arnica.

By examination of flower head, structural differences. In anthemis the involucre scales are ovate-oblong and scarious margin. In arnica they are lanceolate and hairy margin.

(4) Quillaja from elm.

By taste, the former being very acrid and sternutatory; the latter insipid and mucilaginous.

(5) Pepper from allspice.

Allspice is covered with the short, four-pointed calyx limb or its remnants and a short style, which is absent in the pepper; again allspice is two-celled whilst pepper is not.

What official drugs are obtained from the order solanaceae?

Capsicum, belladonna, hyoscyamus, stramonium, and scopola.

What properties characterize most of the plants of this order?

They are poisonous and narcotic, and owe their activity to alkaloidal constituents, which, with the exception of capsicum, are mydriatic, and chemically are isomers of atropine.

GAMBIR.

(1) State what gambir is and describe it?

(2) Why was it made official?

(3) From what is it obtained?

(4) What action does ferric chloride have upon the diluted tincture?

(5) Give the pharmacopoeial limit of ash after incineration.

(6) Name the constituents and official preparations.

(7) Give the medicinal properties and dose?

(1) An extract from leaves and twigs. Irregular masses reddish-brown, externally to light brown, fracture dull and earthy, friable, crystalline, inodorous, bitterish, very astringent, with a sweetish after-taste, free from starch.

(2) To replace catechu, as gambir can be obtained of a more uniform quality.

(3) From Ourouparia gambir, family Rubiaceæ.

(4) It turns greenish-black, forming an ink-like compound.

(5) Not more than 5 per cent of ash.

(6) Catechutannic acid, catechin, and catechol. Tinctura gambir composita, trochisci gambir.

(7) It is astringent and tonic. Dose, 15 grains.

COLCHICUM.

(1) Give genus and habitat of the plant.

(2) What portions of the plant are used for official preparations?

(3) Name the official preparations?

(4) State when the official parts of the plant should be collected.

(5) What portion of the plant represents in most concentrated form its active principles?

(6) Name the active principle and give dose of the same.

(7) What are the medicinal properties of colchicum?

(1) Liliaceæ. Southern and central Europe.

(2) The corm and seed.

(3) Extractum colchici cormi, fluidextractum colchici seminis, tinctura colchici seminis, vinum colchici seminis.

(4) The corm in early summer. The seed in autumn.

(5) The seed.

(6) Official as colchicina. Dose, $^1/_{128}$ of a grain.

(7) It is used as an alterative, chiefly in gout and rheumatism.

NUX VOMICA.

(1) What is nux vomica?

(2) Describe the seed.

(3) Name the active constituents.

(4) Two preparations of nux vomica are official, the dry extract and the fluidextract, the official tincture being made from the dry extract; give the formulas for the three products.

(5) What percentage of total alkaloids should the dry or powdered extract contain?

(6) What amount of total alkaloids should 100 C.c. of the fluidextract contain?

(7) What amount in 100 C.c. of tincture?

(8) Give the medicinal properties and dose of the powdered nux vomica, dry extract, fluidextract and tincture.

(1) The dried ripe seed of Strychnos nux vomica. It should contain not less than 1.25 per cent strychnine. Family, Loganiaceæ.

(2) Orbicular, nearly flat, 15 to 30 Mm. in diameter, 3 to 5 Mm. thick, externally grayish or greenish gray, the surface covered with short, closely-appressed, satiny hairs, with a slight ridge extending from the center on one side to the edge. Internally whitish-gray, horny and very tough, inodorous; taste intensely bitter.

(3) Strychnine, brucine, loganin, igasuric acid.

(4) Extractum nucis vomicae prepared by exhausting nux vomica with acetic acid and alcohol, evaporating to dryness and adding sugar of milk, if necessary. Fluidextractum nucis vomicae made with a menstrum of three parts alcohol,

one part water and 5% acetic acid. Tinctura nucis vomicae made by dissolving 20 Gm. of extract in sufficient quantity of three parts alcohol and one part water to make 1000 C.c.

(5) At least 5 per cent strychnine.

(6) 100 C.c. contains 1 Gm. of strychnine.

(7) 100 C.c. contains 0.1 Gm. of strychnine.

(8) It is a spinal stimulant and tonic. Dose of drug, 1 grain; extract, 1/4 grain; fluidextract, 1 minim; tincture, 10 minims.

Give the meaning of the following well-known therapeutic terms and mention one drug, chemical and pharmaceutical product applicable to each class: (1) Diaphoretic, (2) antidote, (3) antiseptic, (4) disinfectant, (5) deodorant.

(1) Diaphoretic is a drug that produces sweating, as sulphur, antimony, powder of ipecac and opium.

(2) Anhydrotic is a drug that dries up secretions, as belladonna, potassium iodide, and extract of opium.

(3) An antiseptic is a drug that acts upon pathogenic micro-organisms, preventing their growth and multiplication, such as quinine, corrosive mercuric chloride, and glycerite of phenol.

(4) A disinfectant is a drug that destroys the germs of disease as they exist in the atmosphere, water and discharges, as formaldehyde, phenol, or solution of chlorinated soda.

(5) A deodorant is a drug that destroys foul odors, as charcoal, potassium permanganate, and solution of chlorine.

OPIUM.

(1) What is opium and from what is it obtained?

(2) To what family does the plant belong?

(3) What is the required morphine strength of moist and powdered opium according to U. S. P.?

(4) If you purchase an avoirdupois pound of powdered opium for $4.95, what would be the morphine value represented in the opium at $2.25 per troy ounce?

(5) Give the opium and morphine strength of each of the following products when made according to the U. S. P., viz.: Tincture of opium, tincture of deodorized opium, vinegar of opium and wine of opium.

(1) Opium is the concrete milky exudation obtained by incising the unripe capsules of Papaver somniferum.

(2) Papaveraceæ.

(3) Moist opium, 9%; powdered, 12 to 12½%.

(4) 12% of 7,000 grains equals 840 grains of morphine; then 480 : 840 :: 2.25 : x = $3.94, value of morphine.

(5) They are all 10 per cent opium strength and ⅚ of 1 per cent morphine strength (.833%).

DIGITALIS.

(1) What part of the plant is recognized by the U. S. P., and at what period of the plant growth should this part be collected?

(2) Is it best to make the collection during the inflorescence or otherwise, and how should it be stored to prevent it from deteriorating?

(3) Name the official preparations and give the alcoholic strength of the liquid.

(4) Why does the Pharmacopoeia in its formula for making the infusion direct the addition of alcohol after straining and not before?

(5) Why should official infusion of digitalis always be dispensed when ordered and never one made with the fluidextract?

(1) The leaves. During the second year's growth.

(2) At the commencement of inflorescence. It should be kept in closed cans after being carefully dried.

(3) Infusum digitalis, 1½%; fluidextractum digitalis, 1 C.c. = 1 Gm.; extractum digitalis; tinctura digitalis, 10%.

(4) Because the infusion contains only those principles which are extracted by water and the alcohol is merely added as a preservative.

(5) An infusion made by diluting a fluidextract would be of entirely different composition, as it would contain those principles which are soluble in alcohol; and again, it would precipitate out certain constituents which are soluble in alcohol but insoluble in water.

SARSAPARILLA.

(1) Give the botanical name of the official varieties?

(2) What is the character of the plant from which it is derived?

(3) Give the names of the four best known varieties, and state which of them belong to the mealy and which to the non-mealy varieties.

(4) Which part of the root is directed by the U. S. P. to be rejected?

(5) What is the name of the active principle and its effect on the human system?

(6) Name the official preparations of sarsaparilla.

(1) Smilax medica, Smilax ornata, Smilax papyracea, and Smilax officinalis.

(2) Shrub with long, creeping roots.

(3) Honduras, Jamaica, Rio Negro and Mexican. Mealy varieties are Honduras and Rio Negro; non-mealy are Mexican and Jamaica.

(4) The thick, woody, knotty rhizome, if present, should be removed.

(5) A glucoside called parillin. It is an alterative.

(6) Fluidextractum sarsaparillae compositum.

SENEGA.

(1) Give the name of the plants from which it is derived and the family to which it belongs.

(2) Give its habitat.

(3) Give the names of the official preparations in which it is used.

(4) What are its medicinal properties?

(5) What is the name of its active principle, and why is ammonia used in the manufacture of its fluid preparations?

(1) The dried root of Polygala senega. Family, Polygalaceæ.

(2) United States.

(3) Fluidextractum senegae, syrupus senegae, syrupus scillae compositus.

(4) Expectorant and stimulant.

(5) Senegin and polygalic acid. Liquid preparations are very apt to gelatinize owing to the presence of pectin. This is obviated by using some alkali to dissolve it. Formerly ammonia was used, but in the present Pharmacopœia, solution of potassium hydroxide is advised.

Give the official titles, botanical names and family of each of the following: (1) Male fern, (2) deadly nightshade, (3) sweet flag, (4) marigold, (5) Indian hemp, (6) cayenne pepper, (7) buckthorn, (8) yellow jasmine, (9) cranesbill, (10) boneset.

(1) Aspidium. Dryopteris felix-mas and Dryopteris marginalis. Family, Filices.

(2) Belladonnae folia, belladonnae radix. Atropa belladonna. Family, Solanaceæ.

(3) Calamus. Acorus calamus. Family, Araceæ.

(4) Calendula. Calendula officinalis. Family, Compositæ.

(5) Cannabis indica. Cannabis sativa. Family, Moraceæ.

(6) Capsicum. Capsicum fastigiatum. Family, Solanaceæ.

(7) Frangula. Rhamnus frangula. Family, Rhamnaceæ.

(8) Gelsemium. Gelsemium sempervirens. Family, Loganiaceæ.

(9) Geranium. Geranium maculatum. Family, Geraniaceæ.

(10) Eupatorium. Eupatorium perfoliatum. Family, Compositæ.

(1) What three official drugs are derived from the natural order Piperaceae?

(2) Give the Latin and the American official title and synonyms of each.

(3) Give habitat of each.

(4) Give a brief description of each.

(5) Give the medicinal properties and uses of each.

(1) Pepper, matico, and cubeb.

(2) Piper; pepper; synonym, black pepper. Matico; matico. Cubeba; cubeb.

(3) Pepper: Tropics and India. Matico: Tropical America. Cubeb: Java.

(4) Pepper, fruit nearly four to five Mm. in diameter; externally brownish or grayish black; odor strong, penetrating; taste aromatic and pungent. Matico, leaves 10 to 15 Cm. long, short pistillate, oblong lanceolate. Apex pointed, base heart-shaped, margin finely crenulate, tesselated above, reticulate beneath, aromatic, spicy, bitterish and astringent. Cubeb from 10 to 13 Mm. long, the upper portion globoidal, 4 to 5 Mm. in diameter, contracted at the base into a slender stem-like portion about 6 or 8 Mm. long. Blackish-gray, internally light brown, smooth, one-seeded, strong aromatic, somewhat camphoraceous odor and taste.

(5) Pepper is carminative and condiment. Matico is stimulant and hæmostatic. Cubeb is stimulant, diuretic and expectorant.

Give the official Latin title of the following drugs, the part of the plant used, and when they should be collected for medicinal purposes: (1) Chestnut, (2) witch-hazel, (3) butternut, (4) lobelia, (5) bloodroot, (6) dandelion, (7) couch grass.

(1) Castanea. The leaves. September and October, while leaves are still green.

(2) Hamamelis. The bark and twigs. Collected during early summer.

(3) Juglans. The inner bark of root. Collected in the autumn.

(4) Lobelia. The leaves and tops. Collected after a portion of the capsules have become inflated.

(5) Sanguinaria. The dried rhizome. Collected after the death of the foliage.

(6) Taraxacum. The dried root. Collected in autumn.

(7) Triticum. The dried rhizome. Collected in spring.

(1) What official drugs are the result of the sting of an insect?

(2) What officials drugs consist of whole insects?

(3) What official drugs consist of substances secreted by the digestive organs of the Mammalia?

(4) What official saccharine substance is obtained from a member of the class Mammalia?

(5) What saccharine substance is secreted by a member of the class Insecta?

(1) Galla, acidum gallicum, acidum tannicum. (2) Cantharis, coccus. (3) Pepsinum, pancreatinum, fel bovis. (4) Saccharum lactis. (5) Mel.

JALAPA.

(1) Give the family of the drug and state what other official drug belongs to this family.

(2) What is the character of the root (official part of the plant)?

(3) Name the official preparations made therefrom.

(4) What menstrum is necessary to extract the medicinal properties of this drug?

(5) Give the properties and uses, as well as the dose of Jalap.

(1) Convolvulaceæ. Scammonium.

(2) It is a tuberous root, napiform, pyriform, or oblong, 3 to 8 Cm. long and 1 to 5 Cm. in diameter. The large roots often incised, more or less wrinkled, dark brown, with light-colored spots and short, transverse ridges, internally dark brown, fracture resinous, odor slight but peculiar, taste sweetish and acrid.

(3) Pulvis jalapæ compositus, resina jalapæ.

(4) Alcohol.

(5) Jalap is a cathartic usually combined with other drugs. Dose 10 to 20 grains.

Give the English name and define each of the following: (1) Anthemis, (2) matricaria, (3) crocus, (4) carthamus, (5) cusso, (6) kamala, (7) rhamnus purshiana, (8) frangula, (9) aspidium, (10) aspidosperma.

(1) Anthemis. The dried flower heads of Anthemis nobilis.

(2) Matricaria. The dried flower heads of Matricaria chamomilla.

(3) Saffron. The stigmas of Crocus sativus.

(4) American saffron (safflower). The tubular florets of Carthamus tinctorius.

(5) Kousso. The dried panicles of the pistillate flowers of Hagenia abyssinica.

(6) Kamala. The glands and hairs from the capsules of Mallotus philippinensis.

(7) Cascara sagrada. The dried bark of Rhamnus purshiana.

(8) Frangula. The dried bark of Rhamnus frangula.

(9) Aspidium. The dried rhizome of Dryopteris felix-mas and Dryopteris marginalis.

(10) Quebracho. The bark of Aspidosperma quebracho-blanco.

Name the eighteen official drugs derived from animal sources, giving the unabbreviated official Latin names of each.

Adeps, adeps lanæ, sevum præparatum, gelatinum, pepsinum, cantharis, pancreatinum, glandulæ suprarenales siccæ, glandulæ thyroideæ siccæ, serum antidiphthericum, moschus, coccus, acidum lacticum, saccharum lactis, fel bovis, cetaceum, oleum morrhuæ, cera flava.

Give the Latin official name of each of the following drugs and name the active principles of each: (1) Yellow jasmine, (2) fish berries, (3) calabar beans, (4) deadly night-shade, (5) monkshood, (6) foxglove, (7) culver's root, (8) nut-galls, (9) senna, (10) willow bark.

(1) Gelsemium. It contains gelsemine, gelseminine, and gelseminic acid.

(2) Cocculus indicus. It contains menispermine and picrotoxin.

(3) Physostigma. It contains physostigmine, calabarine, and physosterin.

(4) Belladonnæ folia, belladonnæ radix. It contains atropine, hyoscyamine, and belladonnine.

(5) Aconitum. It contains aconitine, picraconitine, aconitic acid.

(6) Digitalis. It contains digitalin, digitalein, digitoxin, digitonin, and digitin.

(7) Leptandra. It contains leptandrin and resin.

(8) Galla. It contains tannic acid and gallic acid.

(9) Senna. It contains cathartic acid, anthroglucosennin, emodin, and chrysophanic acid.

(10) Salix. It contains salicin.

State whether the following active principles are alkaloids, glucosides, neutral or proximate principles; also give rational adult dose of each: (1) Gelsemine, (2) picrotoxin, (3) caffeine, (4) physostigmine, (5) digitalin, (6) aconitine, (7) atropine, (8) salicin, (9) sparteine, (10) veratrine.

(1) Gelsemine: Alkaloid; dose, $^1/_{60}$ grain.

(2) Picrotoxin: Neutral principle; dose, $^1/_{60}$ grain.

(3) Caffeine: Basic proximate principle; dose, 1 grain.

(4) Physostigmine: Alkaloid; dose, $^1/_{64}$ grain.

(5) Digitalin: Glucoside; dose, $^1/_{10}$ grain; "German." Pure digitoxin is $^1/_{50}$ grain.

(6) Aconitine: Alkaloid; dose, $^1/_{400}$ grain.

(7) Atropine: Alkaloid; dose, $^1/_{100}$ grain.

(8) Salicin: Glucoside; dose, 15 grains.

(9) Sparteine: Alkaloid; dose of sulphate, ⅕ grain.

(10) Veratrine: A mixture of alkaloids; dose, $^1/_{80}$ grain.

From what are the following medicinal substances prepared? Give the medical properties of each: (1) Codeine, (2) apomorphine, (3) homatropine, (4) acetanilid, (5) salol.

(1) Codeine from opium. Used as a sedative and analgesic.

(2) Apomorphine is a derivative of morphine. Used as a nauseating expectorant and emetic.

(3) Homatropine is prepared by the condensation of tropine and mandelic acid. Used as mydriatic.

(4) Acetanilid is the monacetyl derivative of aniline. Used as antipyretic and analgesic.

(5) Prepared by heating salicylic acid with phenol. Used as intestinal antiseptic and antipyretic.

CINNAMON.

(1) What varieties of Cinnamon are official?

(2) Give the official Latin and American names.

(3) How would you distinguish them?

(4) What official variety is the official oil of cinnamon derived from?

(5) What variety is used in making (a) tinctura cardamomi composita, tinctura gambir composita, and tinctura lavandulae composita, and what variety is used in making (b) pulvis aromaticus and tinctura cinnamomi.

(1) Saigon and Ceylon cinnamon.

(2) Cinnamomum saigonicum, cinnamomum zeylanicum. Saigon cinnamon, Ceylon cinnamon.

(3) In Ceylon cinnamon the outer bark has been removed by scraping, while in Saigon cinnamon it is unscraped.

(4) Cassia cinnamon.

(5) (a) In all three tinctures the Saigon variety is used. (b) Saigon cinnamon is used in both of these preparations also.

GUARANA.

(1) What is guarana?

(2) What is its botanical origin and from what country is it obtained?

(3) Describe guarana as it is usually met in the market; also state how it is prepared by natives.

(4) What is its chief medicinal constituent or active principle?

(5) What other well-known substances contain the same active principle, and what are its medical properties and uses?

(1) A dried paste consisting chiefly of the crushed seed.

(2) Paullinia cupana. Northern and western Brazil.

(3) Usually in cylindrical sticks, dark reddish-brown, fracture uneven, showing numerous coarse fragments of seeds, odor slight, taste astringent, somewhat smoky and pleasantly bitter, then sweetish. The seeds are roasted, then broken, kneaded with water into a pasty mass, then formed into cakes and dried by artificial and solar heat.

(4) Caffeine.

(5) Coffee, tea, maté, kola, and cacao bean. It is a nerve stimulant and diuretic.

NATURAL OLEORESINS.

(1) Name two official natural oleoresins.

(2) What useful and well-known volatile oil is obtained from one of them?

(3) How is this oil directed to be rectified for internal use by the U. S. P.?

(4) What other official product is obtained from the same oleoresin?

(1) Copaiba, Terebinthina. (2) Oleum terebinthinæ. (3) By distillation mixed with solution of sodium hydroxide. (4) Resina.

OLEORESINS.

(1) How many manufactured oleoresins are official?

(2) Name them.

(3) Give the official method of manufacture and the menstruum in each case.

(4) Name the one extensively used as a remedy for tapeworm and give the adult dose of the same.

(5) State which of them is used as an expectorant remedy and is an ingredient in one of the official troches; also name the one known as a valuable counter-irritant and forming part of one of the official plasters.

(1) Six.

(2) Oleoresina aspidii, oleoresina capsici, oleoresina cubebæ, oleoresina lupulini, oleoresina piperis, oleoresina zingiberis.

(3) They are all prepared by percolation until exhausted. They are all percolated with acetone except cubeb, in which alcohol is used.

(4) Oleoresin of aspidium. Dose, ½ to 1 fluid drachm.

(5) The expectorant is oleoresin of cubeb; also used in troches of cubeb. Counter-irritant is oleoresin of capsicum, and used in capsicum plaster.

Give the meaning or definition of the following terms applied to the action of certain drugs and mention one drug belonging to each class: (1) Analgesic, (2) antispasmodic, (3) mydriatic, (4) myotic, (5) sternutatory, (6) diaphoretic, (7) galactagogue, (8) pustulant, (9) aphrodisiac, (10) anaphrodisiac.

(1) Analgesic is a drug that allays pain, as acetanilid.

(2) Antispasmodic is a drug that allays irregular action of the voluntary or involuntary muscles by a calmative influence upon the nervous system, such as valerian.

(3) Mydriatic is a drug that dilates the pupil of the eye, as atropine.

(4) Myotic is a drug that contracts the pupil of the eye. as physostigmine.

(5) Sternutatory is a drug that irritates the nasal mucous membrance, causing sneezing, as quillaja.

(6) Diaphoretic is a drug that produces perspiration, as pilocarpus.

(7) Galactagogue is a drug that increases the mammary secretion, as pilocarpus.

(8) Pustulant is a drug that produces pustules on the skin, as croton oil.

(9) Aphrodisiac is a drug that stimulates the sexual desire, as phosphorus.

(10) Anaphrodisiac is one that diminishes the sexual desire, as bromides.

MEL.

(1) Give the official American name and its specific gravity.

(2) What is it the product of?

(3) What is mel despumatum and how is it prepared?

(4) What is mel rosae and how is it prepared?

(5) How would you ascertain the presence of glucose in the first two products?

(1) Honey. Specific gravity, 1.370.

(2) A saccharine secretion deposited in the honey-comb by the bee. Apis mellifera.

(3) Mel despumatum, now official as mel depuratum, is prepared by heating honey mixed with paper-pulp over a water-bath, removing the scum and straining, then adding 5% of its weight of glycerin as a preservative. This is known as clarified honey.

(4) This is a mixture of clarified honey and fluidextract of rose by simple admixture.

(5) If 2 C.c. of filtered solution of honey (1 in 4) be placed in a test-tube 1 Cm. in diameter, and 1 C.c. of absolute alcohol be allowed to go down the walls of the tube held

in an inclined position so as to form an overlying layer, this should remain clear and the line of contact should not show more than barely noticeable opalescence, which soon disappears; a permanent milky zone should not be produced.

State which of the following active principles are alkaloid, neutral principles, proximate principles, or glucosides; also mention the plants from which they are derived: (1) Codeine, (2) hydrastine, (3) hyoscine, (4) aloin, (5) coniine. Which of them is a liquid alkaloid?

(1) Codeine, an alkaloid from opium.

(2) Hydrastine, an alkaloid from hydrastis.

(3) Hyoscine is an alkaloid and a derivative of hyoscyamine found in hyoscyamus.

(4) Aloin is a neutral principle from aloes.

(5) Coniine is an alkaloid from conium. This is a liquid alkaloid.

Name the six important liquid alkaloids and the drug from which they are derived. State which of these drugs or alkaloids are official.

Sparteine from scoparius. Both official. The alkaloid in the form of the sulphate.

Lobeline from lobelia. Lobelia being official.

Nicotine from tobacco. Neither official.

Coniine from conium. Conium official.

Hygrine from coca. Coca official.

Lupuline from hops. Humulus official.

In the study of Materia Medica: (1) What is the use of the official title of a drug?

(2) In addition to the official Latin title or name, how many other names may the official drug have?

(3) What is the purpose of more than one name?

(4) Give the several names and titles applied to Sabal in the U. S. P.; also its family.

(5) Give the medical properties and uses.

(1) This is the Latin name and is thoroughly descriptive,

and is to be used in designating the drug where precision is required, as in writing prescriptions, labelling store furniture, specimens, etc.

(2) An English name, a synonym or common name may be present, a botanical name in case of vegetable substances, and the symbolic formulæ in the case of chemicals.

(3) Each name has its distinctive use or field, as the official name in scientific work. The English name in the commercial transaction and the synonym by the laity in ordinary conversation.

(4) Sabal, official and English name. Saw palmetto, synonym. Serenoa serrulata, botanical name. Family, Palmæ.

(5) It is used as a diuretic and tonic.

ACACIA.

(1) What is acacia derived from?

(2) Describe it.

(3) Is the reaction of the aqueous solution acid, alkaline or neutral? (a) How does solution of acacia react with basic lead acetate, (b) ferric chloride, (c) sodium borate?

(4) How would you detect the presence of starch or dextrin in powdered acacia?

(5) What official preparations is it a constituent of?

(1) A gummy exudation from Acacia senegal and other species. Family, Leguminosæ.

(2) In roundish tears of various sizes or broken into angular fragments, whitish or yellowish-white, translucent, very brittle, with a glass-like, sometimes iridescent fracture, nearly inodorous, taste insipid and mucilaginous.

(3) Acid. (a) Gelatinous precipitate. (b) Same. (c) Same.

(4) It is not colored blue by iodine (absence of starch) nor red (absence of dextrin).

(5) Mucilago acaciæ, syrupus acaciæ.

ADEPS.

(1) Describe the official lard.

(2) From what part of the hog should it be obtained?

(3) What properties should it have?

(4) How are alkalies, starch and chlorides detected when present as impurities?

(5) How is the presence of cotton-seed oil detected?

(6) What test is given in the U. S. P. to establish the limit of free fatty acids?

(1) It is a soft, white, unctuous solid. Faint odor, free from rancidity, bland taste.

(2) The prepared internal fat of the abdomen. Purify it by washing, melting and straining.

(3) Specific gravity 0.917 at 25° C. Insoluble in water, very slightly in alcohol, readily soluble in ether, chloroform, carbon disulphide, and benzin. It melts at 38° to 40° C.

(4) Alkalies: Distilled water boiled with lard should not acquire an alkaline reaction. Starch: Iodine should not give a bluish coloration. Chlorides: Water boiled with lard, then filtered and acidulated with nitric acid and treated with silver nitrate, should not yield a white precipitate soluble in ammonia water.

(5) If 2 C.c. of the melted and filtered lard be mixed in a test-tube with 2 C.c. of equal volumes of amyl alcohol and carbon disulphide containing 1% of sulphur in solution, and the test-tube immersed to 1/3 or 1/2 its depth in boiling salt-water, no reddish color should be developed in from 10 to 15 minutes.

(6) If 10 Gm. of lard be dissolved in chloroform and the solution mixed with 10 C.c. of alcohol and 1 drop of phenolphthalein solution, it should not require more than 0.2 C.c. of normal potassium hydroxide to produce a pink tint after strongly shaking.

To what three official roots is the term "snake-root" often applied?

Serpentaria, Virginia snake-root; cimicifuga, black snake-root; senega, Seneka snake-root, or rattlesnake-root.

What varieties of senna are official?

Alexandria and India.

What is the difference between caffeine and citrated caffeine.

Citrated caffeine is a mixture of caffeine and citric acid, the latter making it more soluble.

Give the Latin names of black, white and green hellebore?

Black is veratrum nigrum; white and green hellebore are both official under the name veratrum.

How do yellow, green and red iodide of mercury differ?

Yellow and green are official under the name hydrargyri iodidum flavum (formerly viride), and it is mercurous iodide, whilst red iodide is hydrargyri iodidum rubrum, and is mercuric iodide.

Give the average adult dose of the above mercury salts?

Yellow, $\frac{1}{5}$ grain; red, $^1/_{20}$ grain.

SANTONIN.

Give the source and dose for an adult?

Santonin is the inner anhydride or lactone of santonic acid obtained from santonica. Dose, 1 to 2 grains.

What is terebene? Give its medicinal properties and dose?

A liquid consisting of dipentene and other hydrocarbons obtained by the action of concentrated sulphuric acid on oil of turpentine, and subsequent rectification with steam. It is a stimulating expectorant. Dose, 8 to 60 minims.

How do pepsin and saccharated pepsin differ in digestive power?

Saccharated pepsin is one-tenth the strength of pepsin.

Medicinal barks are often described as in flat or quilled pieces. What is meant?

Flat pieces refer to slab-like pieces almost level or only slightly curved, whilst quilled pieces are those in which the bark is rolled on itself layer after layer and shaped like a goose quill.

RESINS.

Define resins, gum-resins and oleoresins.

Resins are natural or induced, solid or semi-solid exudations from plants, characterized by being insoluble in water, mostly soluble in alcohol, uncrystallizable, and melting at a moderate heat. Gum-resins are natural mixtures of gum and resin. Oleoresins are natural mixtures of oil and resin.

What is May-apple root? What is its active principle and dose of its active principle?

May-apple root is official as podophyllum, and the resinous substances extracted from the powdered rhizome with alcohol are official as resina podophylli. Dose, $^1/_{10}$ to $\frac{1}{2}$ grain.

What is strophanthus, its medical properties and the dose of the tincture?

The ripe seed of Strophanthus kombé; family, Apocynaceæ; deprived of its long awn. Strophanthus is a cardiac stimulant and general sedative. Dose of tincture is 8 minims.

Give the source and dose of picrotoxin.

A neutral principle obtained from the seed of Anamirta paniculata; family Menispermaceæ. Dose, $^1/_{60}$ grain.

Give the properties and dose of potassium permanganate.

Potassium permanganate is one of the most powerful oxidizing agents known, hence its value as a disinfectant. Chemically it is a volumetric test and oxidizer. It has been used as an antidote to morphine poisoning and snake bite. In the latter case a strong solution should be injected into the parts which were bitten. Dose, gr. ¼-ii.

What are glycerites and name those official?

These are solutions of medicinal substances in glycerin.

Glyceritum acidi tannici, glyceritum amyli, glyceritum boroglycerini, glyceritum hydrastis, glyceritum phenolis, glyceritum ferri quininæ et strychninæ phosphatum.

What are emulsions and name a natural emulsion?

Emulsions are liquid preparations in which fats, oils, or oleoresinous substances are suspended in water, usually by the intervention of some gummy or mucilaginous substance. Milk is a natural emulsion.

What are enteric medicines?

Medicines that act primarily and directly in the intestinal tract and not in the stomach.

Give the common name of (a) fructus, (b) radix, (c) semen, (d) folia, (e) flora.

(a) Fruit. (b) Root. (c) Seed. (d) Leaves. (e) Flowers.

From what are the following acids obtained: (a) Acetic, (b) citric, (c) carbolic, (d) lactic, (e) oxalic, (f) tartaric?

(a) Ethyl alcohol and destructive distillation of wood. (b) Obtained from limes and lemons. (c) Coal-tar. (d) Milk. (e) Sawdust and cellulose. (f) Argols.

Give the common name and part used of the following: (a) Hydrastis, (b) sanguinaria, (c) stillingia, (d) krameria, (e) colocynth.

(a) Golden-seal; rhizome and roots. (b) Bloodroot; rhizome. (c) Queen's root; root. (d) Rhatany; root. (e) Bitter apple; fruit.

NUX VOMICA.

Give the common name and medical properties?

Dog button, Quaker button. Spinal stimulant and tonic.

What are the two alkaloids of nux vomica?

Strychnine and brucine.

STRAMONIUM.

Name three official preparations.

Extractum stramonii, fluidextractum stramonii, tinctura stramonii.

What is the name of the alkaloid in stramonium?

Daturine, which is a mixture of atropine and hyoscyamine.

What is meant by the term drastic purgatives and name some?

These are strongly irritant to the intestinal mucous membrane and occasion free transudation from its vessels and fluid stools. Jalap, colocynth, gamboge, scammony, elaterium, podophyllum, croton oil.

What is squill? (a) Give botanical name. (b) Habitat. (c) What are its medicinal properties. (d) Name the official preparations.

(a) The bulb of Urginea maritima. Family, Liliaceæ.
(b) Basin of the Mediterranean.
(c) Expectorant, emetic, diuretic.
(d) Acetum scillæ, syrupus scillæ, fluidextractum scillæ, tinctura scillæ, syrupus scillæ compositus.

What per cent are the following: (a) Iodine in tincture of iodine, (b) aconite in tincture of aconite, (c) ammonia in spirit of ammonia, (d) ferrous iodide in syrup of ferrous iodide.

(a) 7%. (b) 10%. (c) 10%. (d) 5%.

Why would you use alcohol in making tincture of ginger and dilute alcohol in making tincture of opium?

Because these are the best solvents of the active constituents in the respective drugs.

What bitter principles are found in Columbo root?

Columbin, berberine and columbic acid.

Which is the stronger alkaloid, strychnine or brucine? Give dose of each.

Strychnine is the stronger. Strychnine, dose, $^{1}/_{60}$ to $^{1}/_{20}$ grain. Brucine, dose, $\frac{1}{12}$ to $\frac{1}{2}$ grain.

How would you distinguish creosote from carbolic acid?

When cooled to low temperature creosote gelatinizes; carbolic acid crystallizes. Creosote, with 120 parts of hot water, forms a clear liquid, which on cooling becomes turbid from the separation of minute oily drops. Carbolic acid does not. The filtrate from these separated oily drops forms a reddish-brown precipitate with bromine test solution. Carbolic acid yields a white precipitate. Creosote does not coagulate collodium; carbolic acid does. If one volume of creosote be mixed with one volume of glycerin a clear mixture will result from which a creosotic layer equal or greater in volume than the creosote employed will separate on the addition of ¼ volume of water. Carbolic acid remains clear. On adding to 10 C.c. of a saturated aqueous solution of creosote 1 drop of ferric chloride T. S. the liquid develops a deep violet-blue tint, which is very transient; it then clouds almost instantly and passes into a grayish-green, then muddy-brown, with finally the formation of a brown precipitate. Carbolic acid produces a violet-blue color, which is permanent.

(a) What is a saturated solution? (b) How much boric acid will dissolve in 1 fluid ounce of water to make a saturated solution? (c) How much potassium iodide?

(a) A saturated solution is one in which the solvent has exercised its power to the fullest extent and cannot retain any more of the dissolved substance.

(b) 25 grains at 25° C.

(c) 651 grains.

Why is lime used as an antidote for poisoning with oxalic acid.

It forms an insoluble calcium oxalate.

Give antidote for phosphorus and prussic acid.

Phosphorus: Copper sulphate or old French oil of turpentine, no other oils; potassium permanganate. Prussic acid: Usual emetics, hydrogen peroxide, ammonia by inhalation, strong cardiac and respiratory stimulants. Cobalt nitrate is a chemical antidote.

Give dose and use of the following: (a) Phosphorus, (b) nitro-glycerin, (c) wine of ipecac, (d) compound powder of jalap, (e) antimonial powder, (f) fluidextract of goldenseal, (g) fluidextract of aconite, (h) castor oil, (i) tincture of digitalis, (j) Dover's Powder.

(a) $^1/_{128}$ grain. Alterative, nerve tonic.
(b) 1 minim. Cardiac stimulant, vaso-dilator.
(c) 15 minims. Expectorant, emetic.
(d) 5 to 30 grains. Diuretic, purgative.
(e) 3 to 5 grains. Diaphoretic.
(f) 30 minims. Astringent, alterative, tonic.
(g) 1 minim. Cardiac sedative, antipyretic.
(h) 2 drams to 1 ounce. Purgative.
(i) 15 minims. Cardiac stimulant.
(j) 10 grains. Diaphoretic.

Define (a) laxative, (b) antiseptic, (c) emollient, (d) emmenagogue. Give an example of each.

(a) Laxative. Is a drug that produces a very mild purgative action, causing softened stools, as figs.

(b) Antiseptic. Is a drug that arrests or prevents the development of micro-organisms, such as corrosive mercuric chloride.

(c) Emollient. Is a bland substance applied to the skin for a protective action, such as glycerin.

(d) Emmenagogue. Is a drug that stimulates the menstrual flow, as ergot.

(a) Into what four important classes are drugs of animal origin divided? (b) Give examples of each.

Mammalia—Adeps, adeps lanæ, sevum præparatum, gelatinum, pepsinum, pancreatinum, glandulæ suprarenales siccæ, glandulæ thyroideæ siccæ, serum antidiphthericum, moschus, acidum lacticum, saccharum lactis, fel bovis, cetaceum.

Pisces—Oleum morrhuæ.

Insecta—Cera flava, cantharis, coccus, mel.

Aves—No official drugs in this group.

What is the botanical name of (a) wild cherry, (b) cascara sagrada, (c) dandelion, (d) cramp bark, (e) henbane. Give medicinal properties and two official preparations of each drug.

(a) Prunus serotina. Infusum pruni virginianæ, 2 fluid drachms; syrupus pruni virginianæ, 1 fluid drachm. It is sedative and tonic.

(b) Rhamnus purshiana. Fluidextractum rhamni purshianæ, 15 minims; extractum rhamni purshianæ, 4 grains. It is laxative.

(c) Taraxacum officinale. Fluidextractum taraxaci, 1 to 3 fluid drachms; extractum taraxaci, 30 to 60 grains. Cholagogue and alterative.

(d) Viburnum opulus. Fluidextractum viburni opuli, ½ to 1 fluid drachm. Only one official preparation. Nervine, tonic, diuretic.

(e) Hyoscyamus niger. Fluidextractum hyoscyami, 3 minims; tinctura hyoscyami, 15 minims. Narcotic, hypnotic, mydriatic.

Give common name for each of the following and state what part of the plant is used: (a) Absinthium, (b) rhus toxicodendron, (c) carum, (d) asclepias, (e) lappa, (f) eupatorium.

(a) Wormwood. The leaves and tops.
(b) Poison ivy. Leaves.
(c) Caraway. The dried fruit.
(d) Pleurisy root. Root.
(e) Burdock. Root.
(f) Boneset, thoroughwort. Leaves and tops.

Name four preparations of opium, giving Latin title, dose and strength of each.

Acetum opii; dose, 8 minims; strength 10%. Tinctura opii; dose, 8 minims; strength, 10%; vinum opii; dose, 8 minims; strength, 10%. Tinctura opii deodorati; dose, 8 minims; strength, 10%.

RHATANY.

(a) Give full botanical name, (b) habitat, (c) part used, (d) medical properties.

(a) Krameria triandra. (b) South America. (c) Root. (d) Astringent.

ZEA.

(a) Give common name. (b) What part of the plant is employed in medicine?

(a) Corn silk. (b) Styles and stigmas.

Give doses and therapeutic effect of codeine. How may the presence of morphine be detected?

The dose of codeine is ¼ grain to 2 grains. It is a sedative in action, but less narcotic than morphine, which it resembles.

Morphine is detected as follows: Add 1 drop of ferric chloride T. S. to small crystal of potassium ferricyanide dissolved in 10 C.c. water, then 1 C.c. codeine solution (1-100). If a blue color develops at once, morphine is present.

THEORETICAL CHEMISTRY, FORMULÆ, ETC.

What is chemistry?

Chemistry is that science which treats of the composition of matter and of the changes which this composition may undergo.

What is an element?

An element is a substance which cannot, by known means, be resolved into simpler substances.

How many elements are there?

About 78.

Name ten elements, with symbols, and atomic weights.

Arsenic, As, 74.4. Bromine, Br, 79.36. Calcium, Ca, 39.8. Carbon, C, 11.91. Chlorine, Cl, 35.18. Hydrogen, H, 1.000. Iron, Fe, 55.5. Lead, Pb, 205.35. Mercury, Hg, 198.5. Oxygen, O, 15.88.

Define chemism.

Chemism is that force which determines combination between atoms.

What is atomic weight?

The atomic weight of an element is the relative weight of one atom of that element as compared with the weight of one atom of hydrogen.

What is molecular weight?

The molecular weight is the sum of the atomic weights of the atoms in a molecule.

What do you mean by valency? What is meant by the valence (or quantivalence) of an element?

Valence (valency or quantivalence) is that property of an element by virture of which its atom can hold in combination a certain number of atoms of another kind. The valence of an element refers to the number of atoms of hydrogen with which its atom will combine, or which it can replace in a molecule.

What is a symbol?

An abbreviation of the Latin name for an element. Example: Hydrogen, H, from Hydrogenium.

What is a formula?

A formula is a group of symbols representing a chemical compound. Example: Water, H_2O.

What is an equation?

An algebraic arrangement of symbols, or formulæ, or both, expressing a chemical reaction. Example: $Zn + H_2SO_4 = ZnSO_4 + H_2$.

What is an acid?

A compound containing hydrogen, part of which at least may be replaced by a metal to form a salt.

What element must all acids contain?

Hydrogen.

What is a base?

The chemical opposite of an acid; the true bases are hydroxides of the metals and basic radicals.

What is a salt?

A compound formed from an acid by substituting a metal or basic radical for part or all of the replaceable hydrogen of the acid.

What is meant by a normal salt in chemistry?

A salt formed from an acid by substituting a metal or basic radical for all of the replaceable hydrogen of the acid.

Are normal salts neutral, acid, or alkaline to litmus paper?

Generally neutral, but may be either acid or alkaline.

What is the meaning of the termination "ic" and "ous" when applied to acids made from the same element?

The acid with the lesser relative amount of oxygen takes the termination "ous"; that with the greater amount of oxygen takes the termination "ic."

Give the chemical formulae of sulphuric and sulphurous acid.

H_2SO_4 and H_2SO_3, respectively.

Give the chemical formulae of nitric acid and nitrous acid.

HNO_3 and HNO_2, respectively.

What does it mean when these terminations (ous and ic) are applied to the oxides of the same metals?

The "ous" termination indicates the lower valence (real or apparent) of the metallic element, *e. g.*, mercurous oxide, Hg_2O, and mercuric oxide, HgO.

Give the chemical formula for (a) mercuric oxide; (b) mercurous oxide; (c) ferric oxide; (d) ferrous oxide.

(a) HgO. (b) Hg_2O. (c) Fe_2O_3. (d) FeO.

Distinguish between "ate" and "ite" salts.

Salts with names ending in "ate" are derived from oxyacids ending in "ic"; salts with names ending in "ite" are derived from acids with names ending in "ous."

What is a radical?

An atom or group of atoms with unsatisfied valences—incapable of existing in the free state.

Write the official Latin name for each of the following: (1) Lime water, (2) Goulard's Extract, (3) Cold Cream, (4) White Vitriol, (5) Red Precipitate, (6) Rochelle Salts.

(1) Liquor calcis. (2) Liquor plumbi subacetatis. (3)

Unguentum aquæ rosæ. (4) Zinci sulphas. (5) Hydrargyri oxidum rubrum. (6) Potassii et sodii tartras.

State briefly the composition and mode of formation of acids, bases, and salts. Give an example of each.

Acids are compounds containing hydrogen, part of which at least may be replaced by a metal. A true base is a compound of a metal or basic radical with hydroxyl. Salts are compounds formed from acids by replacing part or all of the hydrogen of the acid with metals or basic radicals. Examples: Acid, H_2SO_4. Base, $Ba(OH)_2$. Salt, $BaSO_4$.

Define reduction, oxidation, valence, electrolysis, amorphous, deliquescent, efflorescent.

Reduction is the process of removing oxygen from a compound. Oxidation is the process of introducing oxygen into a compound. Valence is that property of an element by virtue of which its atom combines with a certain number of atoms of another kind. Electrolysis is the decomposition of a fluid by the electric current. Amorphous is a term applied to substances without regularity of internal structure, to substances not crystalline. Deliquescent substances are those which absorb water on exposure to air. Efflorescent substances are those which lose water of crystallization on exposure to air.

Define precipitant.

A precipitant is a substance which, added to a solution, will cause a precipitation of part or all of its constituents.

Define indicator.

A substance used to determine the completion of a chemical change.

Give the meaning of the following abbreviations adopted by the United States Pharmacopeia: T. S., V. S., N, $\frac{N}{2}$, $\frac{N}{10}$, $\frac{N}{100}$, $\frac{2}{N}$ or 2N.

Test solution, volumetric solution, normal solution, half-normal solution, tenth-normal solution, hundredth-normal solution, double normal.

Give the chemical formulas and the proper chemical names of the following substances: (1) litharge, (2) sugar of lead, (3) blue vitriol, (4) green vitriol, (5) white vitriol, (6) pearl white, (7) lunar caustic, (8) red precipitate,, (9) calomel, (10) corrosive sublimate.

(1) Lead oxide, PbO. (2) Lead acetate, $Pb\,(C_2H_3O_2)_2 + 3H_2O$. (3) Copper sulphate, $CuSO_4 + 5H_2O$. (4) Ferrous sulphate, $FeSO_4 + 7H_2O$. (5) Zinc sulphate, $ZnSO_4 + 7H_2O$. (6) Bismuth oxychloride, $BiOCl$. (7) Silver nitrate, $AgNO_3$. (8) Mercuric oxide, HgO. (9) Mercurous chloride, Hg_2Cl_2 or $HgCl$. (10) Mercuric chloride, $HgCl_2$.

Chemical terms: Give the meaning of the following chemical terms: (1) Dimorphous, (2) trimorphous, (3) polymorphous, (4) isomorphism, (5) tabular, (6) laminar, (7) acicular, (8) prismatic (when applied to crystals), (9) deliquescent, (10) hygroscopic.

(1) Dimorphous, that which may crystallize in two forms. (2) Trimorphous, that which may crystallize in three forms. (3) Polymorphous, that which may crystallize in more than two forms. (4) Similarity in crystal form. (5) Tablet-like. (6) Scale-like. (7) Needle-like. (8) Long, distinctly crystalline needles. (9) and (10) That which absorbs moisture on exposure to air.

Define the following terms: (a) Oxidizing agent, (b) reducing agent. Give an example of each.

(a) That which will impart oxygen to another substance. Examples: Oxygen and nitric acid.

(b) That which will take oxygen away from another substance. Examples: Hydrogen and carbon.

Define (a) radical, (b) unsaturated molecule, (c) diatomic, (d) monoxide.

(a) An atom or group of atoms with unsatisfied valences incapable of existing in the free state.

(b) A molecule to which atoms may be added without displacing any already present.

(c) Diatomic, consisting of two atoms. The term is generally applied to the hydroxides containing two groups of OH.

(d) Monoxide, an oxide with but one atom of oxygen.

Write chemical formula for (a) phosphoric acid, (d) acetic acid, (c) ferric chloride, (d) ferrous carbonate.

(a) H_3PO_4. (b) $HC_2H_3O_2$. (c) Fe_2Cl_6, or $FeCl_3$. (d) $FeCO_3$.

Give the chemical formula for each of the following substances: (1) Hydrogen peroxide, (2) muriatic acid, (3) oil of vitriol, (4) aqua fortis, (5) alcohol, (6) lime, (7) mercuric iodide, (8) copperas, (9) blue vitriol, (10) table salt.

(1) H_2O_2. (2) HCl. (3) H_2SO_4. (4) HNO_3. (5) C_2H_5OH. (6) CaO. (7) HgI_2. (8) $FeSO_4.7H_2O$. (9) $CuSO_4.5H_2O$. (10) NaCl.

Give English names of each of the following: (a) $K_2Cr_2O_7$, (b) HCN, (c) $K_3C_6H_5O_7$, (d) $Fe_2(SO_4)_3$.

(a) Potassium dichromate. (b) Hydrocyanic acid or prussic acid. (c) Potassium citrate. (d) Ferric sulphate.

Complete the following equations:

(a) $Pb(C_2H_3O_2)_2 + NaI =$
(b) $NaHSO_4 + Pb(NO_3)_2 =$
(c) $ZnCO_3 + HCl =$
(d) $FeS_2 + H_2SO_4 =$

(a) $Pb(C_2H_3O_2)_2 + 2NaI = 2NaC_2H_3O_2 + PbI_2$.
(b) $NaHSO_4 + Pb(NO_3)_2 = HNO_3 + NaNO_3 + PbSO_4$.
(c) $ZnCO_3 + 2HCl = ZnCl_2 + H_2O + CO_2$.
(d) $FeS_2 + H_2SO_4 =$, if strongly heated, H_2S and $FeSO_4 + S$, which burns in the air to SO_2. In the cold no reaction takes place.

Finish out the following equations:

(a) $K_2CO_3 + Ca(OH)_2 =$

(b) $CaCO_3 + H_2SO_4 =$

(c) $NaHCO_3 + KHC_4H_4O_6 =$

(d) $CaO + H_2O =$

(e) Give the common names of the salts obtained in (c) and (d).

(a) $= 2KOH + CaCO_3$.

(b) $= CaSO_4 + H_2O + CO_2$.

(c) $= NaKC_4H_4O_6 + H_2O + CO_2$.

(d) $= Ca(OH)_2$.

(e) $NaKC_4H_4O_6$ is Rochelle salt; $Ca(OH)_2$ is calcium hydroxide or slaked lime.

Give the English names of the following: (a) $Pb(NO_3)_2$, (b) $Hg(CN)_2$, (c) $Fe_2(OH)_6$, (d) AsI_3.

(a) Lead nitrate. (b) Mercuric cyanide. (c) Ferric hydroxide. (d) Arsenic tri-iodide.

Complete the following equations:

(a) $BaO_2 + H_3PO_4 =$

(b) $PbCl_2 + H_2S =$

(c) $MnO_2 + 4HCl =$

(d) $CaF_2 + H_2SO_4 =$

(a) $= H_2O_2 + BaHPO_4$.

(b) $= PbS + 2HCl$.

(c) $= MnCl_2 + 2H_2O + Cl_2$.

(d) $= CaSO_4 + 2HF$.

What percentage of iron is present in $FeSO_4.7H_2O$?

At. wts.: $Fe = 56$, $S = 32$, $O = 16$, $H = 1$.

20+ per cent. Using the atomic weights given, the molecular weight of the compound is 278. 56 divided by 278 gives the amount of iron in one part of the substance—the amount in 100 parts (per cent) equals 100 times the amount in one part.

State how many grammes of ferrous sulphate can be

obtained from 150 grammes of iron if allowed to react with a sufficient quantity of sulphuric acid. You may assume that the iron and acid are 100 per cent pure. At. wts.: Fe = 56, H = 1, S = 32, O = 16.

The reaction between iron and sulphuric acid is represented by the equation $Fe + H_2SO_4 = FeSO_4 + H_2$. Using the atomic weights given, the molecular weight of $FeSO_4$ is 152. According to the equation, then, 56 parts of Fe will make 152 parts of $FeSO_4$. One part of Fe will make (152 ÷ 56) = 2.71 parts of $FeSO_4$, and 150 parts (grammes) of iron will make (150 × 2.71) = 406.5 parts (grammes) of ferrous sulphate, $FeSO_4$.

How much zinc oxide can be made by calcining 100 grammes of zinc carbonate ($ZnCO_3$)? Zn = 65, C = 12, O = 16.

The reaction may be represented by the equation $ZnCO_3 = ZnO + CO_2$. Using the atomic weights given, the molecular weight of $ZnCO_3$ is 125, and the molecular weight of the zinc oxide ZnO is 81. From the equation, then, 125 parts of $ZnCO_3$ will yield 81 parts of ZnO. One part of $ZnCO_3$ will yield, 81 ÷ 125 = 0.648 part of ZnO, and 100 parts will yield, 0.648 × 100 = 64.8 parts (or grammes).

Complete the following equations:

(a) $Sb_2O_3 + 2KHC_4H_4O_6 =$
(b) $HgCl_2 + 2KOH =$
(c) $H_2SO_4 + Zn =$

(a) $= 2KSbOC_4H_4O_6 + H_2O$.
(b) $= HgO + 2KCl + H_2O$.
(c) $= ZnSO_4 + H_2$.

Give the common names of the following:

(a) $K(SbO)C_4H_4O_6$.
(b) $KNaC_4H_4O_6$.
(c) $Al_2K_2(SO_4)_4$.
(d) $(MgCO_3)_4.Mg(OH)_2$.

(a) Tartar emetic. (b) Rochelle salt. (c) Potash alum. (d) Magnesium carbonate, or magnesia alba.

Write the chemical formula for each of the following: (a) mercurous oxide, (b) potassium sulphide, (c) ferric chloride, (d) ammonium sulphate.

(a) Hg_2O. (b) K_2S. (c) Fe_2Cl_6 or $FeCl_3$. (d) $(NH_4)_2SO_4$.

Give the English names for each of the following:

(a) $Zn(NO_3)_2$.
(b) KHC_2O_4.
(c) $Pb(C_2H_3O_2)_2$.
(d) Na_2HPO_4.

(a) Zinc nitrate. (b) Potassium hydrogen oxalate. (c) Lead acetate. (d) Disodium phosphate.

Complete the following equations:

(a) $2KI + HgCl_2 =$
(b) $FeBr_2 + Na_2CO_3 =$
(c) $NH_4OH + HBr =$
(d) $ZnO + 2HC_2H_3O_2 =$

(a) $= 2KCl + HgI_2$.
(b) $= FeCO_3 + 2NaBr$.
(c) $= NH_4Br + H_2O$.
(d) $= Zn(C_2H_3O_2)_2 + H_2O$.

Complete the following equations:

(a) $AgNO_3 + HCl =$
(b) $KHCO_3 + HC_2H_3O_2 =$
(c) $2NaI + 2H_2SO_4 + MnO_2 =$
(d) $2HC_7H_5O_2 + Na_2CO_3 =$
(e) $Na_2B_4O_7 + 10H_2O + 2HCl =$

(a) $= AgCl + HNO_3$.
(b) $= KC_2H_3O_2 + H_2O + CO_2$.
(c) $= Na_2SO_4 + MnSO_4 + I_2 + 2H_2O$.
(d) $= 2NaC_7H_5O_2 + H_2O + CO_2$.
(e) $= 2NaCl + 4H_3BO_3 + 5H_2O$.

Give the symbol and atomic weight of the following: (1) Aluminum, (2) antimony, (3) bismuth, (4) calcium,

(5) copper, (6) iodine, (7) iron, (8) lead, (9) magnesium, (10) silver.

(1) Al, 26.9. (2) Sb, 119.3. (3) Bi, 206.9. (4) Ca, 39.8. (5) Cu, 63.1. (6) I, 125.9. (7) Fe, 55.5. (8) Pb, 205.35. (9) Mg, 24.18. (10) Ag, 107.12.

Write the chemical names represented in the following symbols:

(1) $Al_2K_2(SO_4)_4.24H_2O$.
(2) Sb_2O_3.
(3) $BiC_6H_5O_7$.
(4) CaS.
(5) $CuSO_4.5H_2O$.
(6) NH_4I.
(7) $FeSO_4.7H_2O$.
(8) PbI_2.
(9) $MgSO_4.7H_2O$.
(10) $AgCN$.

(1) Aluminium-potassium sulphate or alum. (2) Antimony trioxide. (3) Bismuth citrate. (4) Calcium sulphide. (5) Copper sulphate. (6) Ammonium iodide. (7) Ferrous sulphate. (8) Lead iodide. (9) Magnesium sulphate. (10) Silver cyanide.

Give the chemical formula for each of the following: (a) Alcohol, (b) sulphuric acid, (c) copper sulphate, (d) ammonium chloride.

(a) C_2H_5OH. (b) H_2SO_4. (c) $CuSO_4.5H_2O$. (d) NH_4Cl.

Complete the following equations:

(a) $As_2O_3 + KHCO_3 =$
(b) $K_2SO_4 + BaCl_2 =$
(c) $BaO_2 + H_3PO_4 =$
(d) $FeCl_2 + HCl + HNO_3 =$

(a) $As_2O_3 + 4KHCO_3 = 2K_2HAsO_3 + H_2O + 4CO_2$.
(b) $K_2SO_4 + BaCl_2 = BaSO_4 + 2KCl$.

(c) $BaO_2 + H_3PO_4 = BaHPO_4 + H_2O_2$.

(d) $2FeCl_2 + 2HCl + 2HNO_3 = Fe_2Cl_6 + 2H_2O + N_2O_4$.

Write the official Latin name for the following (no abbreviations): (1) Labarraque's Solution, (2) Goulard's Solution, (3) Donovan's Solution, (4) Lugol's Solution, (5) Spirits Mindererus, (6) Basham's Mixture, (7) Carron Oil, (8) Hartshorn Liniment, (9) Sweet Spirits Nitre, (10) Elixir Vitriol.

(1) Liquor sodæ chlorinatæ. (2) Liquor plumbi subacetatis. (3) Liquor arseni et hydrargyri iodidi. (4) Liquor iodi compositus. (5) Liquor ammonii acetatis. (6) Liquor ferri et ammonii acetatis. (7) Linimentum calcis. (8) Linimentum ammoniæ. (9) Spiritus ætheris nitrosi. (10) Acidum sulphuricum aromaticum.

Give the English names for each of the following:

(a) $KClO_3$.

(b) $AgNO_3$.

(c) $HgCl_2$.

(d) $MnSO_4$.

(a) Potassium chlorate. (b) Silver nitrate. (c) Mercuric chloride. (d) Manganese sulphate.

What is the difference between a binary and a tenary compound? Give examples.

A binary compound is one composed of two kinds of atoms or radicals; *e. g.*, NaCl, HBr.

A ternary compound is one composed of three or more kinds of atoms or radicals; *e. g.*, KCNS, H_3PO_4.

What is specific volume?

The specific volume of a substance is the molecular weight of the substance divided by its specific gravity.

Define specific gravity.

Specific gravity is the ratio of the weight of a body compared with the weight of an equal volume of a standard substance.

How can the specific gravity of a substance be determined?

By weighing equal volumes of substance and standard, and dividing the weight of the substance by that of the standard. Also, more conveniently, for liquids, by means of the hydrometer.

What is a hydrometer? (b) alcoholmeter? (c) urinometer? (d) saccharometer?

(a) The hydrometer is an instrument for determining the specific gravity of liquids or solutions containing water. It is generally made of glass tubing, with air-bulb, and so weighted as to be maintained in an upright position when floating. The specific gravity of the liquid is shown by the depth to which the instrument sinks, and is read from a scale on the stem.

(b) The alcoholmeter is an instrument for the determination of the percentage of alcohol in liquids. Its general construction is the same as that of the hydrometer.

(c) The urinometer is a hydrometer with a scale of convenient length suitable for determination of the specific gravity of urine.

(d) A saccharometer is a hydrometer with special scale, arranged to give the percentage of sugar in solution.

Define (a) adhesion, (b) cohesion, (c) give an example of each.

(a) Adhesion is the force of attraction between unlike molecules.

(b) Cohesion is the force of attraction between like molecules.

(c) As an example of adhesion, we have the wetting of a piece of glass with water. As an example of cohesion, we have the "holding together" of the molecules of the water itself.

What is heat? How is it produced? What are the principal sources of heat?

Heat is molecular energy. It is produced by the motion of the molecules of a body. The principal sources of heat are the sun, combustion (oxidation), and other chemical change, electricity, friction, etc.

What do you understand by water of crystallization?

Water of crystallization is water which is necessary to the crystal form.

Define crystallization.

When a substance passing from the fluid to the solid state assumes definite geometric form, depending upon internal structure, it is said to crystallize, or to have undergone crystallization.

What is the difference between simple solution and chemical solution?

A simple or physical solution is one in which the substance dissolved has undergone no chemical change. In a chemical solution the substance dissolves only after having undergone an alteration in composition.

Acids. (1) Describe them briefly.

(2) What element is common to all known acids?

(3) On account of the universal presence of this element they are chemically designated as salts. Salts of what? Illustrate the above by writing out two or three acids in the ordinary manner, the same acids as salts, and the chemical formula of each.

(4) Describe quantivalence of acids.

(5) Give an illustration of univalent, bivalent, and trivalent acids, and prove it with their chemical formula.

(1) An acid is a compound containing hydrogen, part of which, at least, may be replaced by a metal. Acids combine with bases to form salts; they destroy many vegetable colors, and turn blue litmus to red.

(2) Hydrogen.

(3) Salts of hydrogen. *E. g.*, HCl, hydrochloric acid or hydrogen chloride; H_2SO_4, sulphuric acid or hydrogen sulphate; HNO_3, nitric acid or hydrogen nitrate.

(4) The quantivalence or basicity of an acid depends upon the number of atoms of replaceable hydrogen contained in the molecule.

(5) Univalent or monobasic, nitric acid, HNO_3, forming, by replacing the hydrogen with sodium, $NaNO_3$, sodium nitrate. Bivalent or dibasic, sulphuric acid, H_2SO_4, forming, by replacing the hydrogen with sodium, Na_2SO_4, sodium sulphate. Trivalent or tribasic, phosphoric acid, H_3PO_4, forming, by replacing the hydrogen with sodium, Na_3PO_4, normal sodium phosphate.

What percent of absolute acid in the dilute acids, U. S. P.? Are they uniform in strength?

Dilute acetic acid contains not less than 6 per cent. by weight. Dilute hydriodic, hydrobromic, hydrochloric, hypophosphorous, nitric, phosphoric, sulphuric, are all not less than 10 per cent. by weight. Dilute hydrocyanic is not less than 2 per cent. by weight.

THE NON-METALS.

(1) What is oxygen?

(2) What function does it perform in combustion?

(3) State what you know regarding the liberation of oxygen and carbon dioxide by plants.

(4) Explain oxydization.

(5) Explain deoxidization.

(1) Oxygen is a gas, colorless, odorless and tasteless; one of the most abundant of the elements. Symbol, O. Atomic weight, 16.

(2) It is a supporter of combustion—combustion being, essentially, a process of rapid oxidation.

(3) Carbon dioxide is taken in by the plant and under the influence of the chlorophyl combines with water; carbohy-

drates are formed and oxygen is given off. There is, also, a second "respiration" taking place, in which, under proper conditions, oxygen may be absorbed and carbon dioxide given out.

(4) Oxidation is the union of a substance with oxygen; *e. g.*, $Cu + O = CuO$.

(5) Deoxidation, or reduction, consists in the taking away of oxygen from a compound; *e. g.*, $CuO + H_2 = Cu + H_2O$.

(1) What is nitrogen?
(2) How does it occur in nature?
(3) How may it be obtained for experimental purposes?
(4) What are its properties?
(5) What is its mission in nature?
(6) What are nitrogenous or "proteid" compounds?
(7) Give the chemical formula for nitrogen monoxide.
(8) Nitrogen dioxide.
(9) Nitric Acid.
(10) What is aqua regia?

(1) Nitrogen is a colorless, odorless, tasteless gas, a little lighter than air, incombustible, and a non-supporter of combustion. It forms about four-fifths of the atmosphere. Symbol, N. Atomic weight, about 14.

(2) It occurs in the free state in the atmosphere, in combination in some mineral compounds, and in many animal and vegetable compounds.

(3) By heating ammonium nitrite, $NH_4NO_2 = N_2 + 2H_2O$, or by burning phosphorus under a bell-jar. The burning phosphorus unites with the oxygen of the air present, leaving the nitrogen.

(4) See under (1).

(5) A dilutant for the active element oxygen in the atmosphere, and as an essential element of the animal and vegetable tissues.

(6) Complex compounds of nitrogen with carbon, hydrogen, oxygen, and sulphur, and sometimes phosphorus, found in all animal and vegetable organisms.

(7) N_2O.

(8) N_2O_2.

(9) HNO_3.

(10) Aqua regia is an acid mixture of oxides of nitrogen with chlorine, made by bringing together strong nitric and hydrochloric acids.

Acidum Nitro-hydrochloricum: (a) Give official method of preparation, (b) Why is it called "aqua regia?"

(a) Mix together 180 C.c. of nitric acid and 820 C.c. of hydrochloric acid. When effervescence has ceased, pour the products into amber-colored, glass-stoppered bottles.

(b) It is called "aqua regia" because of its solvent action on gold, one of the "regal" metals.

Name the Halogen elements.

Fluorine, chlorine, bromine, and iodine.

Halogens: (1) An important group of four elements, bromine, chlorine, iodine and fluorine, are called halogens, state why.

(2) What is chlorine derived from? (b) Give its chemical symbol and atomic weight.

(3) What is bromine derived from? (b) Give its chemical symbol and atomic weight.

(4) What is iodine derived from? (b) Give its chemical symbol and atomic weight.

(5) Give the names of some of the salts derived from bromine and iodine.

(1) The name "halogen" means "salt-producer," and has been given to these elements because of the saline character of many of their compounds.

(1) (a) From sodium chloride. (b) Symbol, Cl; atomic weight, 35.18.

(3) (a) From sodium bromide and from magnesium bromide. (b) Symbol, Br; atomic weight, 79.36.

(4) (a) From sodium and magnesium iodides, as found in

certain varieties of sea-weed. (b) Symbol, I; atomic weight, 125.9.

(5) Sodium and potassium bromides, sodium hypobromite, sodium and potassium and ammonium iodides.

Give the preparation and properties of Cl, Br, and I.

The same general method of preparation may be used in each case—the chloride, bromide, or iodide of sodium, or of magnesium being decomposed by treatment with manganese dioxide and sulphuric acid.

Chlorine is a yellowish-green gas with suffocating odor, soluble in water, forming "chlorine water." An oxidizing and bleaching agent.

Bromine is a dark reddish-brown volatile liquid giving off pungent, irritating fumes. It is slightly soluble in water, more soluble in alcohol and in ether.

Iodine is a bluish-black, crystalline solid, volatile, giving off violet-colored fumes when heated. Only slightly soluble in pure water, more soluble in water containing potassium iodide, soluble in alcohol and in chloroform.

Chlorine: Give symbol, atomic weight, valence, source, how prepared, giving two methods of preparation with equations, physical properties and tests for identity.

Symbol, Cl. Atomic weight, 35.18. Valence, I. Source, sodium chloride.

Prepared by the action of sulphuric acid and manganese dioxide on sodium chloride and by action of hydrochloric acid on bleaching powder.

$2NaCl + MnO_2 + 2H_2SO_4 = Na_2SO_4 + MnSO_4 + Cl_2 + 2H_2O.$

$Ca(OCl)Cl + 2HCl = CaCl_2 + Cl_2 + H_2O.$

Physical properties: A greenish-yellow gas with suffocating odor, heavier than air, soluble in water.

Tests for identity: It may be recognized by its odor, by its bleaching action on moist litmus paper, by the solvent action of its aqueous solution on gold-leaf, and by the precipitate obtained with silver nitrate.

Muriate of Ammonia: (1) Give its official Latin name and chemical formula; also the common name by which it is generally known.

(2) What is its present commercial source?

(3) What impurity is generally found in the commercial variety, and by what test would you discover its presence in a solution of the suspected salt?

(4) How may muriate of ammonia thus contaminated be purified?

(5) What effect has heat on muriate of ammonia, and what takes place when it is triturated with calcium hydrate?

(1) Ammonii chloridum. NH_4Cl. Sal ammoniac.

(2) From the "ammoniacal liquor" obtained by the washing of the gas, during the preparation of illuminating gas from coal.

(3) If prepared in iron retorts, sal ammoniac is frequently contaminated with iron. Twenty C.c. of the aqueous solution (1-20) should not at once assume a blue color on the addition of five drops of potassium ferrocyanide T. S. (limit of iron).

(4) By mixing the salt with calcium phosphate (5%) and resubliming.

(5) Heat volatilizes or sublimes sal ammoniac. Trituration with calcium hydrate decomposes it, setting free ammonia.

Bromine: Give symbol, atomic weight, source, how prepared, physical properties, official preparations, and tests for identity.

Symbol, Br. Atomic weight, 79.36. Source, bromides of sodium and magnesium associated with sea salt.

Prepared by the action of sulphuric acid and manganese dioxide on sodium or magnesium bromide.

$2NaBr + MnO_2 + 2H_2SO_4 = Na_2SO_4 + MnSO_4 + Br_2 + 2H_2O$.

Bromine is a dark reddish-brown liquid, about three times as heavy as water. It is volatile at ordinary temperatures, giving off irritating fumes. Slightly soluble in water, it is soluble in alcohol, ether and chloroform.

Official preparations are: bromine itself, and the bromides of ammonium, calcium, lithium, potassium, sodium, strontium, and zinc.

Tests for identity: The characteristic odor, the bleaching of litmus, the yellow color obtained with starch solution, and, for the bromides, the characteristic precipitate with silver nitrate solution.

How may colorless tinctures of iodine be made?

By adding ammonium hydroxide to the ordinary tincture, thereby converting the iodine into ammonium iodide.

What substances decompose iodides?

Chlorine, bromine, certain oxides of nitrogen, ozone, etc.

Acid Boracic: Chemical formula, source, how prepared, official preparations.

Formula, H_3BO_3. Source: Found native in old volcanic regions, and also as sodium borate. Prepared by the action of hydrochloric acid on a hot solution of borax (sodium borate). Official preparations are the acid itself, acidum boricum, and the ointment, unguentum acidi borici.

Phosphorus: (1) What is it, and from what is it made?

(2) Describe it, and state how it should be preserved.

(3) How many oxides and acids of phosphorus are known? Give their names and the chemical formula of the oxides.

(4) Which of the acids is official? Give the chemical formula. (a) Describe glacial phosphoric acid and give its chemical formula.

(5) What three preparations of phosphorus are official, and what is the strength of each?

(1) A non-metal. Symbol, P. Atomic weight, 30.77. Made from tricalcic phosphate, as found in bone ash.

(2) A translucent, nearly colorless solid of waxy appearance and consistency, giving off fumes in the air, these fumes being luminous in the dark. It oxidizes on exposure to the air, and must be preserved under water and protected from light. Practically insoluble in water, soluble in carbon disulphide and oils.

(3) There are two common oxides, P_2O_3, phosphorus trioxide, and P_2O_5, phosphorus pentoxide. Derived from the trioxide we have phosphorous acid, H_3PO_3; derived from the pentoxide we have phosphoric acid, H_3PO_4, pyrophosphoric acid, $H_4P_2O_7$, and metaphosphoric acid, HPO_3. Hypophosphorous acid has the formula, H_3PO_2.

(4) The official acids are the hypophosphorous acid and the phosphoric acid, the former, H_3PO_2, the latter, H_3PO_4. (a) Glacial phosphoric acid is the metaphosphoric acid HPO_3, a whitish, pasty mass which dissolves in water and is gradually converted back to the ortho-phosphoric acid, H_3PO_4.

(5) The eighth revision has but one phosphorus preparation, pills of phosphorus, containing, each, 0.6 milligrams ($^1/_{100}$ gr.).

Sulphur: (1) What is sulphur, and from what is it obtained? Give its symbol and atomic weight.

(2) In what forms is it found in the markets?

(3) Give the Latin names for the official varieties of sulphur.

(4) Mention some of the impurities liable to be present in the official varieties; also mention some of the solvents of sulphur.

(5) (a) Why is water of ammonia used in the preparation of one of the official forms of sulphur? (b) Into what two pharmaceutical preparations does this particular kind of sulphur enter as one of its component parts.

(1) Sulphur is one of the non-metals. Symbol, S. Atomic weight, 31.83. It is obtained from the native sulphur found in the free state in nature, and from the sulphide of iron.

(2) In yellow, brittle masses, known as roll sulphur, or as a fine, yellow powder, known as flowers of sulphur.

. (3) Sulphur lotum, sulphur precipitatum, sulphur sublimatum.

(4) Sulphur lotum may contain earthy and metallic impurities, arsenic, oxides of sulphur (acids), and ammonia. Sulphur precipitatum is tested especially for arsenic, lime salts and acids. Sulphur sublimatum is tested for earthy and metallic impurities, arsenic, and acids.

Sulphur is soluble in carbon disulphide, in oil of turpentine, and in many other oils, in ether and in chloroform.

(5) (a) To remove sulphurous oxide. (b) Unguentum sulphuris and pulvis glycyrrhizæ compositus.

Hydrogen Sulphide: Give chemical formula, molecular weight, how prepared; show reaction by equation, physical properties.

Formula, H_2S. Molecular weight, 33.83.

Prepared by the action of an acid on ferrous sulphide, as shown by the equation, $FeS + 2HCl = H_2S + FeCl_2$.

Physical properties: A colorless gas with peculiar characteristic odor, slightly heavier than air, soluble in water, burns with a blue flame.

Give the preparation of carbon disulphide, and some of its properties.

It is made by passing the vapor of sulphur over red-hot charcoal. It is a volatile, colorless or pale-yellow liquid, with peculiar disagreeable odor. It is inflammable, and the vapor mixed with air is explosive. Heavier than water, insoluble in water, mixes with alcohol and ether. Used as a solvent for sulphur, phosphorus, rubber, fats and oils.

What is CO? How can it be made?

CO is carbon monoxide, a colorless, tasteless, inflammable gas, made by burning carbon with an insufficient supply of air, or by passing carbon dioxide over red-hot coals.

State changes air undergoes during respiration?

The air consists essentially of a mixture of oxygen and nitrogen, with small quantities of water and carbon dioxide. Taken into the lungs it loses part of its oxygen and receives from the blood an increase in carbon dioxide and water. The nitrogen remains practically unchanged.

How is hydrocyanic acid formed?

It may be made by decomposing the metallic cyanides with hydrochloric or sulphuric acid.

Give method of preparation of hydrogen. Why is the flame of hydrogen colorless?

Hydrogen may be prepared by the action of zinc on sulphuric acid, by the action of metallic sodium on water, and by the electrolytic decomposition of water. Ordinary flame is luminous from presence of unconsumed and incandescent carbon particles; these are absent in the burning of hydrogen; the factors of the combustion, hydrogen and oxygen, and the product, water-vapor, are all colorless.

What is the chemical composition of water, and how could you prove it?

By volume, hydrogen two parts, oxygen one part. By weight, hydrogen one part, oxygen eight parts. This can be proved by passing a current of electricity through a vessel of water slightly acidulated with sulphuric acid; the water is decomposed and the two gases set free in the proportion named above. If the two gases be mixed and exploded by an electric spark, they recombine and water is again formed.

What is the composition of water and of air? Are they chemical compounds or mixtures?

For the composition of water, see preceding answer. Air (the atmosphere) contains, approximately, by volume, oxygen 21 parts, nitrogen 79 parts; or by weight, oxygen 23 parts, nitrogen 77 parts (together with small amounts of carbon dioxide, water, etc.).

Water is a chemical compound. Air is a mixture.

(1) Give symbol, valence, and atomic weight of nitrogen.

(2) State properties of nitrogen, and how does it occur in combination?

(3) Give method of its preparation by chemical equation.

(1) Symbol, N. Valence, III and V. Atomic weight, 13.93.

(2) It is a colorless, odorless, tasteless gas, a little lighter than air, incombustible, and a non-supporter of combustion. It occurs in combination in some mineral compounds, as in nitrates and nitrites, and in many animal and vegetable compounds in the form of proteids.

(3) $NH_4NO_2 = N_2 + 2H_2O$.

What are nitrates?

Salts of nitric acid.

Name three official inorganic acids. Give specific gravity of each.

Nitric acid; specific gravity 1.403. Hydrochloric acid; specific gravity 1.158. Sulphuric acid; specific gravity 1.826.

Give formula for sulphuric acid. How made. Give chemical formula for two sulphates in your opinion the most important. Give properties and uses.

Sulphuric acid, with the formula H_2SO_4, is made by roasting iron pyrites, or by burning sulphur, to form sulphur dioxide. This then is oxidized to sulphur trioxide by mixing with nitric acid fumes, and, finally, the sulphur trioxide is united with water to form sulphuric acid.

Two important sulphates are magnesium sulphate, $MgSO_4.7H_2O$, and copper sulphate, $CuSO_4.5H_2O$. (Other sulphates of importance are those of sodium, iron, calcium, aluminum, etc.)

Magnesium sulphate, or Epsom salts, forms in small, needlelike crystals, with cooling, saline and bitter taste. Easily soluble in water, insoluble in alcohol. Used chiefly for its purgative action.

Copper sulphate, or blue vitriol, forms in large, transparent blue crystals, soluble in water, forming a greenish-blue solution with nauseous taste and acid reaction. It is used largely in the arts, in certain forms of electric batteries, and in medicine, as a caustic, astringent, and emetic.

Aqua hydrogenii dioxidi. (a) State its strength. (b) Write chemical formula for chief ingredient.

(a) About three per cent. by weight. (b) H_2O_2.

Sulphur praecipitatum. (a) Name substances used in its manufacture. (b) What impurity is frequently present in large proportions?

(a) Sublimed sulphur, lime, hydrochloric acid, and water.
(b) Calcium thiosulphate.

What is the difference between aqua ammoniae and spiritus ammoniae?

Aqua ammoniæ is the aqueous solution of ammonia, containing 10 per cent. by weight of the gas. Spiritus ammoniæ is an alcoholic solution of ammonia, containing 10 per cent. by weight of the gas.

Give formula, solubility and dose for (a) ammonium chloride, (b) ammonium carbonate, (c) ammonium bromide.

(a) Ammonium chloride, NH_4Cl. Soluble in 2 parts of water, in 50 parts of alcohol, and in 5 parts of glycerin. Average dose, 0.5 Gm. (7½ grains).

(b) Ammonium carbonate, $NH_4HCO_3.NH_4NH_2CO_2$. Slowly soluble in about 4 parts of water. Alcohol dissolves the carbamate and leaves the acid carbonate. Average dose, 0.25 Gm. (4 grains).

(c) Ammonium bromide, NH_4Br. Soluble in 1.2 parts of water and in 12.5 parts of alcohol. Average dose, 1 Gm. (15 grains).

Give the solubility of the following drugs in alcohol

and in water: (1) Ammonium chloride, (2) ammonium valerate, (3) ammonium bromide, (4) iodum, (5) ammonii carbonas, (6) potassium iodide, (7) potassium bromide, (8) boric acid, (9) borax.

(1) Ammonium chloride, soluble in 2 parts of water and in 50 parts of alcohol.

(2) Ammonium valerate, very soluble in alcohol and in water.

(3) Ammonium bromide, soluble in 1.2 parts of water and in 12.5 parts of alcohol.

(4) Iodum, soluble in about 5000 parts of water and in 10 parts of alcohol.

(5) Ammonii carbonas, soluble, slowly, in about 4 parts of water. Alcohol dissolves the salt in part (dissolving the carbamate and leaving undissolved the acid carbonate).

(6) Potassium iodide, soluble in 0.7 parts of water and in about 12 parts of alcohol.

(7) Potassium bromide, soluble in about 1.5 parts of water and in about 180 parts of alcohol.

(8) Boric acid, soluble in 18 parts of water and in 15.3 parts of alcohol at 25° C.; in 3 parts of boiling water and in 4.3 parts of boiling alcohol.

(9) Borax, soluble in 20.4 parts of water and in 0.5 parts of boiling water; insoluble in alcohol.

METALS.

What are the alkali metals, and their properties?

The alkali metals are lithium, sodium, potassium (rubidium, cæsium). They are soft, silvery-white metals with a strong affinity for oxygen. They decompose water, forming oxides and hydroxides of alkaline nature. They are typical metals, strongly electro-positive, all monads, and occur in nature only in combination with other elements.

(1) What is lithium?
(2) Give its source?
(3) By what test is it identified?

(4) Name the official lithium salts.

(5) Give their medicinal properties and dose.

(1) Lithium is a metal belonging to the alkali group.

(2) It occurs in nature in certain mineral waters and in the form of silicate in the mineral lepidolite.

(3) It may be identified by the carmine-red color obtained on heating in a non-luminous flame.

(4) The official lithium salts are: Benzoate, bromide, carbonate, citrate, and salicylate.

(5) Benzoate, 1 Gm. (15 grains), antilithic, diuretic, antirheumatic. Bromide, 1 Gm. (15 grains), sedative. Carbonate, 0.5 Gm. (7½ grains), used as benzoate, antilithic, etc. Citrate, 0.5 Gm. (7½ grains), used as benzoate. Salicylate, 1 Gm. (15 grains), used as substitute for sodium salicylate in gout, articular rheumatism, etc.

What is the chemical nature of table salt?

It is the chloride of sodium, NaCl.

What is soda ash?

A mixture of sodium carbonate and calcium sulphide obtained as an intermediate product in the making of sodium carbonate.

What substances are found in baking-powder?

Baking-powder contains sodium bicarbonate mixed with potassium hydrogen tartrate, sodium acid phosphate, or aluminum sulphate.

Seidlitz Powders: (a) State composition of blue and white powders. (b) What chemical is formed by the combination of the two?

(a) The blue paper contains Rochelle salt, 2 drs., and sodium bicarbonate, 40 grs.; the white paper contains tartaric acid, 35 grs.

(b) Carbon dioxide.

(1) What is potassium?

(2) What is potassa?

(3) What is potassium hydroxide?

(4) What is the percentage strength of the official potassium hydrate?

(1) Potassium is a metal of the alkali group.

(2) Potassa is the old name (Pharm. 1890) for potassium hydroxide.

(3) Potassium hydroxide is the potassii hydroxidum, U. S. P., with the formula KOH.

(4) Five per cent.

What is the formula for potassium bromide? for saltpeter?

Potassium bromide, KBr. Saltpeter, KNO_3.

Magnesium. (1) What is it? Describe it as usually found in the markets and give its symbol.

(2) What official product is formed when it is burned in contact with air?

(3) What two varieties of this magnesium compound are official, and under what official names do they appear and from what are they made?

(4) What is the character of magnesium light and what is it used for?

(5) What is milk of magnesia and how is it prepared?

(1) Magnesium is a metal, classed usually with the metals of the "alkaline earths." Symbol, Mg. Found on the market either in powder or in form of gray ribbon.

(2) Magnesii oxidum.

(3) Magnesium oxide and heavy magnesium oxide. Magnesii oxidum and magnesii oxidum ponderosum. They are both made by calcining the basic carbonate of magnesium, which has two forms, light and heavy. Calcining the light variety gives magnesii oxidum; calcining the heavy gives magnesii oxidum ponderosum.

(4) The magnesium light is made by burning magnesium; it is a brilliant white light, used in photography.

(5) Milk of magnesia is water containing magnesium hydroxide in suspension. It is made by adding sodium hydroxide to a solution of a magnesium salt.

What is $MgSO_4.7H_2O$? How made? What used for?

Magnesium sulphate or Epsom salts. Made by the action of sulphuric acid on magnesium carbonate. It is used as a cathartic and, in fevers, as a refrigerant. Used also as an antidote for lead-poisoning.

Calcium. Give symbol and atomic weight.

Calcium: Symbol, Ca. Atomic weight, 39.8.

Calx. (1) How does the U. S. Pharmacopoeia direct that it shall be made?

(2) What are marble and oyster shells, chemically speaking?

(3) What effect does prolonged heat have upon these substances?

(4) How is lime directed to be kept, and why?

(5) What official preparations are made from lime?

(1) It is "prepared by calcining white marble, or the purest varieties of native calcium carbonate."

(2) Calcium carbonate.

(3) Carbon dioxide is driven off, calcium oxide remaining.

(4) It must be kept in well-closed vessels, in a dry place, because it otherwise would absorb carbon dioxide and water from the air.

(5) Liquor calcis and syrupus calcis.

Liquor Calcis: (1) Give the American official name and synonym.

(2) How is it directed to be made?

(3) Why are the first 400 C.c. rejected?

(4) Why is the undissolved lime poured into the retainer with the solution?

(5) What are its medicinal properties and uses?

(1) Lime water or solution of calcium hydroxide.

(2) Slake the lime (12 grammes) by the gradual addition of 400 C.c. of distilled water and agitate occasionally during half an hour. Allow the suspended particles to subside, decant the supernatant liquid and reject it; then add to the residue 3600 C.c. of distilled water, agitate thoroughly, let stand for 24 hours, agitate again, let coarser particles subside, and pour liquid, with undissolved calcium hydroxide, into a glass-stoppered bottle.

(3) The first washing is for the purpose of removing chlorides and other soluble impurities.

(4) In order that the solution may be kept saturated.

(5) It is used as an antacid, tonic, and astringent; *e. g.*, in dyspepsia, uric acid conditions, etc., and also externally in ulcers, burns, etc.

(1) Show by equation what reaction occurs in making liquor calcis, U. S. P.

(2) Why should this preparation not be made from compressed tablets?

(3) What is the cause of the deposit or scum on the surface of this preparation?

(4) How would you remove the deposit formed on the sides of a container in which lime water has been dispensed for a long time?

(5) What are the medicinal uses of lime water?

(1) $CaO + H_2O = Ca(OH)_2$.

(2) Because the lime must be fresh and intimately mixed with the water.

(3) The formation of a layer of calcium carbonate.

(4) By cleansing with hydrochloric acid.

(5) Antacid, tonic and astringent.

Calx Chlorinata. (1) How is it made?

(2) Describe it.

(3) How is it directed to be preserved or kept?

(4) Why should care be exercised in keeping it?

(5) What percentage of available chlorine should it contain?

(1) Calx chlorinata is made by the action of chlorine upon calcium hydroxide.

(2) It is a white or grayish-white granular powder, exhaling the odor of hypochlorous acid, having a repulsive saline taste, and becoming moist and gradually decomposing on exposure to air.

(3) In well-closed vessels, in a cool and dry place.

(4) Because on exposure it gradually decomposes, losing chlorine gas.

(5) It should contain not less than 35 per cent. of available chlorine.

What is plaster of Paris? What is gypsum? How do they differ?

Plaster of Paris is calcium sulphate, $CaSO_4$.

Gypsum is the native crystalline calcium sulphate, $CaSO_4.2H_2O$.

These two substances differ in the fact that plaster of Paris is made by driving off the water from gypsum by means of heat.

What is whiting?

Whiting is practically the same as prepared chalk, being made by the pulverization and elutriation of crude chalk. Chemically it is calcium carbonate.

What is the solubility in alcohol and in water of calcium hypophosphite?

It is insoluble in alcohol, soluble in 6.5 parts of water at 25° C., and in 6 parts of boiling water.

Describe the shape of calcium oxalate as seen under the microscope.

It occurs in small, octohedral crystals, assuming "envelope" and dumb-bell forms.

Iron. Name the two classes of compounds of iron. Give formula for the two chlorides, for ferrous sulphide, for ferrous sulphate.

The two classes of compounds of iron are the ferrous and the ferric.

Ferrous chloride, $FeCl_2$. Ferric chloride, Fe_2Cl_6, or $FeCl_3$. Ferrous sulphide, FeS. Ferrous sulphate, $FeSO_4$.

Give directions for preparing ferric hydrate.

Ferric hydrate may be made by adding ammonia to a solution of a ferric salt.

Ferric hydroxidum, U. S. P., is to be prepared as follows: To 138 C.c. of ammonia water add 500 C.c. of cold water, then, with constant stirring, 100 C.c. of solution of ferric sulphate. Wash the precipitate by decantation.

Syrupus ferri iodide. (a) How much ferrous iodide must it contain? (b) Should it be kept in a dark or a light place? Explain.

(a) It should contain about five per cent. by weight of ferrous iodide.

(b) It should be kept in the dark, the action of light favoring oxidation to ferric iodide. (A decomposed solution will clear, and improve in appearance, when exposed to direct sunlight, but the percentage of ferrous iodide is lessened.)

Basham's Mixture. (a) Give official name. (b) What precautions are necessary in making to assure a stable product?

(a) Liquor ferri et ammonii acetatis.

(b) The solution should be freshly made, and care must be taken that a neutral, not alkaline, solution of ammonium acetate be used.

What is the chemical formula for alum?

The U. S. P. formula is $AlK(SO_4)_2 + 12H_2O$.

(1) What is zinc?

(2) How is zinc oxide made?

(3) How is zinc oleate made?

(4) Describe the official zinc oleate.

(5) Describe zinc phosphide.

(6) How is it made?

(7) Give its therapeutic properties, and dose.

(8) Describe zinc phosphate.

(9) How is it made?

(10) Give therapeutic properties, and dose.

(1) Zinc is a metal; symbol, Zn; atomic weight, 64.9.

(2) Zinc oxide is made by burning zinc in the air, or by calcining the precipitated basic carbonate.

(3) Zinc acetate dissolved in water is added to a solution of sodium oleate. Filter through muslin and wash the precipitate thoroughly.

(4) Zinc oleate is a soft, white powder containing the equivalent of about 13 per cent. zinc oxide. By mixing with oleic acid an ointment may easily be prepared.

(5) Zinc phosphide occurs as a gritty powder of a dark gray color, or in crystalline fragments of a dark metallic lustre, and has a faint odor and taste of phosphorus.

(6) Made by passing vapor of phosphorus in a current of dry hydrogen over fused zinc.

(7) Used for the same purposes as is phosphorus—as a nutritive stimulant to the nervous system. The usual commencing dose is 0.003 Gm. ($^1/_{20}$ grain).

(8) Zinc phosphate is a white powder, insoluble in water, but soluble in acids.

(9) Zinc phosphate is made by the reaction between zinc sulphate and an alkaline phosphate.

(10) It has been recommended especially in nervous diseases, insanity, epilepsy, etc. Dose, 0.033 to 0.25 Gm. (½ to 4 grains).

NOTE.—The zinc oleate and the zinc phosphide referred to in this question as official have been dropped from the new pharmacopœia. Zinc phosphate is, of course, not official.

How would you prepare zinc sulphate? Give the chemical formula for zinc chloride.

Zinc sulphate is prepared by the interaction of diluted sulphuric acid and metallic zinc.
The chemical formula for zinc chloride is $ZnCl_2$.

Lead. (1) What is lead?
(2) Give its chemical symbol.
(3) What is litharge?
(4) Give its chemical formula.
(5) What is sugar of lead?
(6) Give its chemical formula.
(7) What important official preparation is made with the above two lead compounds?
(8) What is red lead?
(9) Give its chemical formula.
(10) How is it obtained?

(1) Lead is a soft, bluish-white metal with low melting-point.
(2) Symbol, Pb.
(3) Litharge is one of the oxides of lead.
(4) Formula $= PbO$.
(5) Sugar of lead is the acetate of lead.
(6) Formula $Pb(C_2H_3O_2)_2.3H_2O$.
(7) Liquor plumbi subacetatis.
(8) Red lead is an oxide of lead.
(9) Formula $= Pb_3O_4$.
(10) Obtained by continued gentle heating of litharge in the air.

What is black lead?

Graphite or carbon.

Why is solution of subacetate of lead always milky in appearance?

Because of its tendency to absorb carbon dioxide from the air.

What is the solubility of lead acetate in water and in alcohol?

Soluble in 2 parts of water and in 30 parts of alcohol at 25° C.

Bismuth. (a) How does it occur in nature, and how is the metal obtained?

(b) What is the quantivalence?

(c) Name the official salts and give formula of one.

(d) Is the official salt with nitric acid neutral, alkaline or acid to litmus paper?

(e) How may the two principal salts of bismuth be distinguished from each other?

(a) Bismuth occurs in nature in the free state and also as the sulphide. The metal is obtained from the sulphide by first roasting, until it has become converted into the oxide, and then reducing the oxide with carbon.

(b) Quantivalence = III.

(c) Bismuth citrate, bismuth and ammonium citrate, bismuth subcarbonate, subgallate, subnitrate and subsalicylate. The formula for the bismuth subnitrate is commonly written $BiONO_3.H_2O$.

(d) Faintly acid to moist litmus paper.

(e) Bismuth subcarbonate may be readily distinguished from the subnitrate by the addition of hydrochloric acid—the subcarbonate dissolving with effervescence.

Give symbol and atomic weight for antimony.

Symbol = Sb. Atomic weight = 119.3.

Give symbol and atomic weight for gold.

Symbol = Au. Atomic weight = 195.7.

Give formula for chloride of gold.

$AuCl_3$.

Give solubility of gold and sodium chloride in alcohol and in water.

The compound is very soluble in water, and at least half of it should be soluble in cold alcohol.

Give chemical formula for nitrate of silver and for the oxide.

Silver nitrate = $AgNO_3$. Silver oxide = Ag_2O.

Why is a solution of silver nitrate milky when made with ordinary water? What kind of water should be used?

The solution becomes milky because of precipitation of the silver by the salts in the water, generally because of formation of silver chloride.

Distilled water should be used for the solution.

How is diluted silver nitrate made?

"Diluted" or "mitigated" silver nitrate is made by fusing together 30 grammes of silver nitrate with 60 grammes of potassium nitrate.

Give the preparation, properties, and formulae of both oxides of copper.

Cuprous oxide, Cu_2O, is a red powder, obtained by the action of a reducing agent on an alkaline solution of a cupric salt.

Cupric oxide, CuO, is a black powder, obtained by heating metallic copper in the air.

What is (a) blue vitriol? (b) green vitriol? (c) white vitriol? (d) oil of vitriol?

(a) Copper sulphate. (b) Ferrous sulphate. (c) Zinc sulphate. (d) Sulphuric acid.

Hydrargyrum. State (a) chemical symbol, (b) atomic weight, (c) specific gravity.

(a) Symbol = Hg. (b) Atomic weight = 198.5. (c) Specific gravity = 13.535 at 25° C.

Mercury. (1) Give the unabbreviated official name, specific gravity, and symbol of mercury, and state from what localities or countries is it obtained.

(2) In what form does it usually exist in nature, and by what process is the metal obtained from it?

(3) What two series of salts are formed with mercury?

(a) To what series does corrosive sublimate belong?

(b) Give chemical formula and dose of corrosive sublimate.

(4) To which series does Calomel belong? (a) Give the chemical formula for calomel and dose. (b) Give the chemical test for ascertaining the presence of corrosive sublimate in calomel.

(5) Name the official preparations containing metallic mercury, and the percentage of mercury in each.

(1) Hydrargyrum. Specific gravity = 13.535 at 25° C. Symbol = Hg. It is found in Spain, California, Mexico, Peru, Japan, and China.

(2) It is found in nature as the sulphide, cinnabar, the metal, being obtained by mixing the ore with iron (this combining with the sulphur) and the mercury being then distilled over.

(3) Mercurous compounds and mercuric compounds. (a) Corrosive sublimate belongs to the mercuric compounds. (b) Formula, $HgCl_2$; dose, 0.003 Gm. ($^1/_{20}$ grain).

(4) Calomel is a mercurous compound (a) with the formula Hg_2Cl_2 or HgCl. Dose, as a laxative, 0.125 Gm. (2 grains); as alterative, 0.065 Gm. (1 grain). (b) If two grammes be shaken with 20 C.c. of ether, filtered, and the filtrate evaporated, and 10 C.c. of distilled water added, not more than a slight opalescence should result upon the addition of silver nitrate, T. S., to 5 C.c. of the filtrate, and no change of color should be produced upon adding a few drops of ammonium sulphide, T. S., to the remainder.

(5) Hydrargyrum cum creta, 38 per cent.; massa hydrargyri, 33 per cent.; unguentum hydrargyri, 50 per cent., and unguentum hydrargyri dilutum, about 33 per cent.

Mercury. (1) Describe this metal.

(2) Where is it found in greatest abundance, and in what form?

(3) If a globule of commercial mercury is allowed to roll over a clean white surface it leaves a streak or track; what is this track familiarly called, and what is it due to?

(4) How is mercury purified? (b) Give its chemical symbol. (c) Its specific gravity. (d) The temperature at which it solidifies and boils or vaporizes. (e) Give its official Latin name and synonym.

(5) State what pharmaceutical products are made from mercury.

(1) Mercury is a bright, silver-white metal, liquid at ordinary temperature, odorless and tasteless.

(2) It is found as the sulphide, the mineral cinnabar, in Spain, California, Mexico, Peru, Japan and China.

(3) The metal is said to "drag a tail"; the mark is due to impurities—lead, etc.

(4) It may be purified by careful distillation, or by shaking with dilute sulphuric acid to which a few drops of a solution of potassium dichromate are added from time to time. The contaminating metals are thereby oxidized and dissolved.

(b) Symbol, Hg.

(c) Specific gravity, 13.535.

(d) It solidifies at 39.38° C. (38.88° F.). It volatilizes slowly at ordinary temperature, but boils and volatilizes rapidly at 357.25° C.

(e) Hydrargyrum or quicksilver.

(5) Hydrargyrum cum creta, massa hydrargyri, unguentum hydrargyri, and unguentum hydrargyri dilutum.

Give the (a) chemical and (b) physical points of difference between calomel and corrosive sublimate.

(a) Calomel is a mercurous salt with formula Hg_2Cl_2 or HgCl, with corrosive sublimate is a mercuric salt with formula $HgCl_2$. Calomel turns black on addition of ammonium hydroxide, while corrosive sublimate is apparently unchanged.

(b) Calomel is insoluble in water, alcohol, or ether, while corrosive sublimate is soluble.

How is calomel made?

By subliming a mixture of mercuric chloride and mercury, or by adding sodium chloride to a solution of mercurous nitrate.

What is formed when a soluble chloride is added to a solution of mercurous nitrate?

Calomel, or mercurous chloride, known sometimes as "precipitated calomel."

Salts of mercury. (1) Give the official Latin and American names and synonyms of mercurous chloride and mercuric chloride.

(2) Give the chemical formula and molecular weight of each.

(3) Describe both chemicals and give their solubility in alcohol, ether and water.

(4) State what effect lime water would have on each of them.

(5) What effect does ammonium chloride have upon mercuric chloride?

(1) Mercurous chloride = hydrargyri chloridum mite, or mild mercurous chloride, or calomel.

Mercuric chloride = hydrargyri chloridum corrosivum, or corrosive mercuric chloride, or corrosive sublimate.

(b) Mercurous chloride, $Hg_2Cl_2 = 467.36$, or $HgCl = 233.68$. Mercuric chloride, $HgCl_2 = 268.86$.

(3) Calomel is a white, impalpable powder, odorless, tasteless, and permanent in air. It is insoluble in alcohol, ether or water. Corrosive sublimate is a white, crystalline substance, odorless, but with an acrid, persistent, metallic taste; permanent in the air. It is soluble in 13 parts of water and 3 parts of alcohol, at 25° C.; soluble in 2 parts of boiling water and in 1.2 parts of boiling alcohol. It is soluble in about 4 parts of ether.

(4) With calomel, lime-water forms "black wash," a preparation containing mercurous oxide. With corrosive sublimate, lime-water forms "yellow wash," a preparation containing mercuric oxide.

(5) None chemically, though in presence of ammonium chloride the solubility of mercuric chloride is increased. Solutions of mercuric chloride with ammonium chloride (or with sodium chloride) are less liable to decomposition than solutions of mercuric chloride alone.

Mercurial Salts. (1) State briefly the chemical and physical difference between hydrargyri oxidum flavum and hydrargyri oxidum rubrum of the U. S. Pharmacopoeia.

(2) State why the yellow oxide is the better for making ointments for the eye and other delicate surfaces.

(3) Give the chemical formula and atomic weight of both products.

(4) An ointment of both oxides is official, give the percentage of strength of each.

(5) Give the adult dose of both for internal use.

(1) Hydrargyri oxidum flavum is an orange-yellow, amorphous, heavy, impalpable powder. Hydrargyri oxidum rubrum is a heavy, orange-red, crystalline powder. There is no chemical difference between the two.

(2) Because of its finer subdivision.

(3) HgO, with molecular weight of 214.38.

(4) Ten per cent. in each.

(5) Not used internally.

Mercurial Products: (1) State briefly the chemical and physical difference between hydrargyri iodidum flavum and hydrargyri iodidum rubrum.

(2) Give the chemical formula and molecular weight of each.

(3) What are the medicinal properties of each?

(4) In what form are they most frequently prescribed, and dispensed?

(5) Give the usual adult dose of each?

(1) Hydrargyri iodum flavum is the mercurous iodide. It is a bright yellow, amorphous powder, odorless and tasteless; insoluble in alcohol or ether, almost insoluble in water. Hydrargyri iodum rubrum is the mercuric iodide. It is a scarlet-red, amorphous powder, odorless and tasteless; soluble in 116 parts of alcohol and in 85 parts of ether, almost insoluble in water.

(2) Hydrargyri iodum flavum, Hg_2I_2, molecular weight, 648.8; or HgI, molecular weight, 324.4. Hydrargyri iodum rubrum, HgI_2, with the molecular weight of 450.3.

(3) The yellow iodide is used chiefly as an antisyphlitic, emmenagogue, and alterative; the red iodide, in addition also, as a germicide and antiseptic.

(4) In tablet form.

(5) The yellow iodide is used in an average dose of 0.01 Gm. ($1/6$ grain). The red iodide is used in an average dose of 0.003 Gm. ($^1/_{20}$ grain).

ANALYTICAL.

State difference between qualitative and quantitative analysis.

Qualitative analysis seeks to discover what substances are present in a given compound or mixture. Quantitative analysis seeks the quantity of each substance present.

(1) What metals are precipitated by ammonium hydrate?

(2) Which of these redissolve by an excess?

(3) The salts of what metal form a deep blue solution with ammonium hydrate?

(4) What sulphides are yellow?

(5) What sulphides are black?

(1) Magnesium (partially), aluminum, chromium, iron, manganese, zinc, nickel, cobalt, antimony, mercury, bismuth, copper, cadmium, tin, gold, lead, and silver.

(2) Zinc, nickel, cobalt, copper, cadmium, tin (slightly), and silver.

(3) Copper.

(4) Arsenic and cadmium.

(5) Iron, nickel, cobalt, mercury, bismuth, copper, gold, lead, and silver.

Give chemical tests for detecting in solution the following official salts: (a) Silver nitrate, (b) lead acetate, (c) ammonium chloride, (d) ferric chloride, (e) corrosive sublimate.

(a) Hydrochloric acid or any soluble chloride yields a curdy-white precipitate of silver chloride, soluble in ammonium hydroxide, insoluble in nitric acid. The nitrate radical can be demonstrated by adding strong sulphuric acid and floating over the mixture a solution of ferrous sulphate. A brown ring develops at the contact of the two liquids.

(b) Hydrochloric acid precipitates lead chloride, soluble in hot water. Hydrogen sulphide precipitates lead sulphide, insoluble in alkalies and alkaline sulphides, but soluble in hot nitric acid. To demonstrate the acetic acid radical, add strong sulphuric acid and warm—note the odor of acetic acid.

(c) Silver nitrate gives a white precipitate, soluble in ammonium hydroxide, insoluble in nitric acid. The ammonium radical may be demonstrated by warming with sodium hydroxide, when fumes of ammonia will be given off.

(d) The iron may be demonstrated by precipitation with ammonium hydroxide, dissolving the precipitate in hydrochloric acid and testing with potassium sulphocyanate, which, with iron, gives a red color. The chloride radical may be demonstrated with silver nitrate, see (c).

(e) Ammonium hydroxide gives a white precipitate, sodium hydroxide gives a yellow precipitate, and hydrogen sulphide a black precipitate.

Give a chemical test of identity for each of the following: (a) Mercuric salt, (b) mercurous salt.

(a) Mercuric salts turn white, or if in solution, give a white precipitate on addition of ammonium hydroxide. Addition of hydrochloric acid gives no precipitate.

(b) Mercurous salts turn black on addition of ammonium hydroxide, and give a white precipitate on addition of hydrochloric acid.

How would you precipitate all the lead from a solution of lead?

By passing through the solution hydrogen sulphide gas until no further precipitation could be obtained.

How would you prove the presence of mercury in a solution?

By the modified Reinsch test: Acidify with hydrochloric acid, introduce a strip of pure, bright, clean, copper foil, The mercury is deposited upon the copper as a grayish coating, which by gentle rubbing assumes a silvery appearance.

How would you determine the presence of arsenic in a solution?

Acidify with hydrochloric acid and pass hydrogen sulphide gas through the solution. A precipitate of yellow sulphide of arsenic is formed, insoluble in hot hydrochloric acid, soluble in alkalies and in alkaline sulphides.

Or apply the Reinsch test: Acidify with hydrochloric acid, introduce a strip of clean, bright copper foil and boil. The arsenic is deposited upon the copper as a gray coating. Dry carefully and heat in a small glass tube. The arsenic is volatilized and deposits upon the cooler portion of the tube in the form of the crystalline oxide.

Describe the Marsh test.

The Marsh test for arsenic is made as follows: Zinc, water, and sulphuric acid are brought together in a flask and the solution to be tested is added. In the presence of arsenic, arsenetted hydrogen, AsH_3, is formed, and this, after drying by passing through a tube containing calcium chloride, is tested as follows: (a) On ignition, it burns with a bluish-white flame and gives off fumes of arsenious oxide. (b) By heating a tube through which it is passing, it is decomposed and metallic arsenic is deposited as a grayish-brown coating. (c) By holding in the flame a piece of cold porcelain, metallic arsenic is again deposited (differentiate from antimony by means of sodium hypochlorite, arsenic soluble, antimony insoluble). (d) By passing the gas into a solution of silver nitrate, black metallic silver is precipitated.

How would you show the absence in potassium iodide of (a) sulphate, (b) iron, (c) lead and copper, (d) sodium?

(a) Test for sulphates by adding solution of barium chloride.

(b) Add ammonium sulphide, a black precipitate or coloration, soluble in cold, dilute hydrochloric acid, indicates iron.

(c) Add ammonium sulphide, a black precipitate or brownish coloration, insoluble in diluted hydrochloric acid, indicates lead.

For copper add hydrogen sulphide test solution. A brownish coloration or brownish-black precipitate, insoluble in diluted hydrochloric acid, but soluble in solution of potassium cyanide, indicates copper.

(d) Make flame test on platinum wire. Sodium = yellow.

How would you detect the presence of salicylic acid in suspected fruit syrups and juices?

Dissolve the syrup or juice in water and add a few drops of a neutral solution of ferric chloride—a violet coloration indicates the presence of salicylic acid.

ORGANIC.

What is organic chemistry?

The chemistry of the hydrocarbons and of their derivatives.

What is a hydrocarbon? Name one.

A compound of carbon and hydrogen; *e. g.*, Benzene, C_6H_6.

What elements are generally found in organic structures?

Carbon, hydrogen, oxygen, nitrogen, and sometimes phosphorus and sulphur.

What is marsh gas? Where found in nature and how prepared in the laboratory?

Marsh gas is known chemically as methane. It is the first hydrocarbon of the first or paraffin series, and has the formula CH_4. It is found in nature in marshes (hence the name), in certain coal mines, and occasionally in large accumulations beneath the surface, forming what is known as natural gas. It may be prepared in the laboratory by heating in a glass tube one part sodium acetate with four parts of soda lime.

Of what series of hydrocarbons is chloroform? Show by chemical equation how it is found. Give its formula.

Chloroform is a derivative of the first or paraffin series. Theoretically its formation may be represented as follows: $CH_4 + 3Cl_2 = CHCl_3 + 3HCl$. Practically, its manufacture from chloral may be represented by $CCl_3COH + NaOH = CHCl_3 + NaCOOH$. Its formula is $CHCl_3$.

What is iodoform, and how is it made?

Iodoform is the tri-iodo derivative from methane, and has the formula CHI_3. It is made by bringing together ethyl alcohol, iodine and potassium hydroxide or carbonate.

How many kinds of alcohol are official? Give the strength of each.

Three: Absolute, not less than 99 per cent. by weight; the regular alcohol, about 92.3 per cent. by weight; and the diluted alcohol, about 41.5 per cent. by weight.

What are alcohols, chemically? (b) Give chemical name for grain alcohol. (c) How is it made? (d) Name a triatomic alcohol in common use. (e) From what is this obtained?

(a) Alcohols are compounds of hydroxyl (OH) with hydrocarbon radicals. (b) Ethyl alcohol. (c) By fermentation of glucose. (d) Glycerin. (e) From fat, by decomposition.

Define saponification.

The decomposition of fat by heating with an alkali, soap and glycerin being produced.

Alcohol: (a) Give chemical name. (b) State its specific gravity.

(a) Ethyl alcohol. (b) Specific gravity, 0.816 at 15.6° C. (60° F.), the standard temperature for alcohol.

How are the following made—a brief outline only re-required? (a) Acetanilide, (b) oxalic acid, (c) chloral hydrate, (d) iodoform, (e) nitric acid.

(a) Acetanilide is made by prolonged boiling of aniline with acetic acid.

(b) Oxalic acid may be made from sugar by oxidation with nitric acid.

(c) Chloral hydrate is prepared by saturating strong alcohol with chlorine gas, or by the action of chlorine gas on aldehyde.

(d) Iodoform is made by bringing together ethyl alcohol, iodine, and potassium hydroxide or carbonate.

(e) Nitric acid is made by the action of sulphuric acid on sodium nitrate.

What is chloroform? How is it made?

Chloroform is a chlorine derivative of methane, with the formula $CHCl_3$. It is made by the action of bleaching powder (chlorine) on ethyl alcohol or on acetone, or by the action of an alkali on chloral.

Write chemical formula for each of the following: (a) Rochelle salts, (b) sal ammoniac, (c) salts tartar, (d) iodoform.

(a) $KNaC_4H_4O_6$. (b) NH_4Cl. (c) K_2CO_3. (d) CHI_3.

Camphor. (a) What is camphor? (b) Name two solid substances which when combined with camphor form solutions?

(a) Camphor belongs to the class of stearoptens, has the formula $C_{10}H_{16}O$, and is obtained by distillation from the branches and leaves of the Laurus camphora.

(b) Menthol and chloral hydrate.

Menthol: (1) What is menthol and from what is it obtained?

(2) Give its chemical formula and how it should be preserved.

(3) If menthol be triturated with about an equal quantity of camphor, thymol, chloral or beta-napthol, what will be the result?

(4) If menthol should be adulterated with paraffine by what method would you detect its presence?

(5) What are its medicinal properties and uses?

(1) Menthol is a secondary alcohol obtained from oil of peppermint.

(2) $C_{10}H_{20}O$. It should be preserved in well-stoppered bottles in a cool place.

(3) A liquid is obtained.

(4) Menthol is volatilized by warming; if paraffin be present a residue will remain.

(5) It is used chiefly as a local anæsthetic, pure or in solution, in neuralgias, angina, tonsilitis, etc.

Give formula for acetic acid. What three strengths are official? What is the source of acetic acid? What is pyroligneous acid?

$HC_2H_3O_2$ or CH_3COOH.

36 per cent.; the dilute, 6 per cent., and the "glacial" not less than 99 per cent.

Acetic acid for commercial purposes is obtained by the distillation of wood.

Pyroligneous acid is the impure distillate from wood, containing as chief ingredients acetic acid and methyl alcohol.

What is the reaction of citric acid on a solution of bicarbonate of soda? Give chemical formula of the product?

Sodium citrate and carbon dioxide are formed. Sodium citrate has the formula, $Na_3C_6H_5O_7$.

Give formula for cream of tartar? How made? What used for?

The formula for cream of tartar is $KHC_4H_4O_6$. It is made from "argol," an impure form of the salt, deposited during the fermentation of grape juice. It is used as a cathartic, diuretic, and aperient.

How is sweet spirits of nitre prepared and how should it be preserved?

It is prepared by adding slowly a solution of sodium nitrite to a mixture, which must be kept cold, of sulphuric acid, alcohol and water.

It must be kept in small, well-stoppered, amber-colored bottles in a cool, dark place.

Starch: (a) Give process by which starch may be obtained. (b) How is starch converted into glucose?

(a) The starchy material (grain, potato, etc.) is rubbed up and steeped with water; sugar and gluten dissolve, while the starch settles to the bottom of the vessel. The water is then decanted and the starch dried.

(b) By boiling with dilute sulphuric acid. $C_6H_{10}O_5 + H_2O = C_6H_{12}O_6$. Or, by the action of ferments.

Carbolic acid. (1) Give its chemical formula and molecular weight.

(2) What is it made from?

(3) Is it a true acid?

(4) What percentage of water is necessary to permanently liquify the crystallized acid?

(5) What effect does carbolic acid have on glycerin? (a) On collodium? (b) On an alcoholic solution of ferric chloride?

(1) C_6H_5OH; molecular weight = 93.34.

(2) Coal tar.

(3) No.

(4) It is soluble in 19.6 parts of water and 25° C.; it is liquified by the addition of about 8 per cent. of water.

(5) It mixes with it, forming a clear liquid. (a) It coagulates collodium. (b) It gives a brownish coloration. In absence of alcohol a violet-blue color is obtained.

Creosote. (1) What is creosote chemically?

(2) From what is it derived?

(3) Describe it, and give its medicinal properties and uses.

(4) What well known variety is esteemed the best?

(5) Creosote is frequently adulterated with carbolic acid; how would you detect the presence of carbolic acid by the simple preliminary test of the solubility of the suspected creosote in water?

(a) What effect does creosote have on glycerin?

(b) On collodium?

(c) On an alcoholic solution of ferric chloride.

(1) A mixture of phenols and phenol derivatives, chiefly guaiacol and creosol.

(2) By distillation from wood-tar.

(3) A yellowish, highly refractive, oily liquid, with smoky odor and a burning caustic taste. Soluble in about 150 parts of water, and in all proportions in alcohol and ether. Used as an antitubercular remedy, as an antiseptic, antipyretic, anthalmintic. Dose, 0.2 C.c. (3 minims).

(4) That from beachwood.

(5) With 120 parts of hot water it forms a clear liquid which, on cooling, becomes turbid from separation of minute oily drops (distinction from and absence of phenol). (a) With an equal volume it forms a clear liquid from which the creosote separates on addition of one-fourth volume of water. (b) There is no permanent coagulum, as with phenol. (c) It gives a transient greenish-brown coloration.

In what proportions is carbolic acid miscible in water?

It dissolves in 19.6 parts of water at 25°; it liquefies on addition of about 8 per cent. of water.

(1) Describe benzoic acid?

(2) What relation does oil of bitter almonds bear to benzoic acid?

(3) What is the relation of benzoic acid to benzene?

(4) Give the formula for both.

(5) From what is benzoic acid naturally obtained?

(1) White or yellowish-white, lustrous scales or friable needles, nearly odorless, or having a slight odor resembling that of benzoin, and an acid, pungent taste.

(2) Oil of bitter almonds contains benzaldehyde, the aldehyde of benzoic acid.

(3) Benzoic acid is derived theoretically from the second hydrocarbon of the series of which benzene is the first.

(4) C_6H_5COOH = benzoic acid. C_6H_6 = benzene.

(5) From benzoin by sublimation.

Acid benzoic. Source, how prepared, official preparations.

It is obtained from benzoin, by sublimation, or artificially from toluol. The acid itself is official; also the salts, the benzoates of ammonium, lithium, and sodium.

Acid Salicylic. Give exact chemical name and structural formula. What are its natural sources, how is it prepared? Name the official salts and esters, and give tests for identity.

Salicylic acid is sometimes known as oxybenzoic acid. The formula is $C_6H_4OH.COOH$. It is found in nature in the natural salicylates, such as oil of wintergreen and sweet birch.

It is prepared commercially by the interaction of sodium carbolate and carbonic anhydride.

Official salicylates and esters are as follows: Ammonium, eserine, lithium, methyl, phenyl, quinine. sodium, and strontium.

Tests for identity are as follows: The saturated aqueous solution is acid to litmus paper and is colored intensely bluish-violet by ferric chloride T. S. On adding to a small portion of salicylic acid in a test-tube about 1 C.c. of concentrated sulphuric acid, then cautiously about 1 C.c. of methyl alcohol in drops, and heating the mixture to boiling, methyl salicylate will be produced, and may be recognized by its odor.

(1) Give Latin name of salicylic acid.
(2) From what is it commercially prepared?
(3) From which official volatile oils may it be prepared?
(4) Name the two official esters of salicylic acid.
(5) In what proportion is it soluble in water?
(6) In alcohol?
(7) In what dose is it usually given?
(8) What are its medicinal uses?

(1) Acidum salicylicum.
(2) From phenol.
(3) From oleum betulae and oleum gaultheriae.
(4) Methylis salicylas and phenylis salicylas.
(5) Soluble in 308 parts of water at 25° C.
(6) Soluble in 2 parts of alcohol at 25° C.
(7) Average dose 0.5 Gm. (7½ grains).
(8) Antiseptic, antirheumatic, antipyretic, antineuralgic.

Acetanilide. Write the structural formula for acetanilide and state to what class of compounds it belongs.

Formula, $C_6H_5NH(CH_3CO)$. Acetanilide belongs to the class of anilides—substitution products of aniline.

(1) Give Latin official name of acetanilide.
(2) Describe it briefly.
(3) What is it chemically?
(4) What is its solubility in water and what in alcohol?
(5) What is pulvis acetanilidi compositus?

(1) Acetanilidum.
(2) Colorless, shining, micaceous, crystalline, laminae, or

a crystalline powder; odorless, having a slightly burning taste, and permanent in the air.

(3) An acetic acid derivative of anilin; one of the class of anilides.

(4) Soluble in 179 parts of water and in 2.5 parts of alcohol at 25° C.

(5) A powder containing 70 grammes of acetanilide with 10 of caffeine and 20 of sodium bicarbonate.

Give chemical formula for acetanilide.

C_8H_9NO.

Acidum tannicum. (a) State its source. (b) State its solubility in water, in alcohol, and in glycerin.

(a) It is obtained from nut-gall.

(b) Soluble in about 0.34 part of water and in 0.23 part alcohol, at 25° C. Soluble in about one part of glycerin with gentle warming.

Extractum Nucis Vomicae. (a) State assay standard. (b) State physical form.

(a) It should contain 5 per cent. of strychnine.

(b) In the form of a powder with sugar of milk.

Give per cent of opium in each of the following: (a) Laudanum, (b) paregoric, (c) wine of opium, (d) deodorized tincture of opium.

(a) Ten per cent. (b) Four-tenths of one per cent. (c) Ten per cent. (d) Ten per cent.

What are the essential alkaloids of opium?

Morphine and codeine.

Dover's Powder. (a) Give official title. (b) Give percentage of each of its constituents.

(a) Pulvis ipecacuanhae et opii.

(b) Ten per cent. each of ipecac and powdered opium, with 80 per cent. sugar of milk.

How is apomorphine prepared?

By heating morphine in a closed tube for several hours with a large excess of hydrochloric acid.

Give a test to show the difference between sulphate of quinine and sulphate of morphine.

Sulphate of quinine gives a bluish fluorescence when dissolved in water. Sulphate of morphine gives an intense red coloration when moistened with nitric acid.

Pepsinum. (a) State standard of strength. (b) How does it behave on exposure to air?

(a) It should be capable of digesting not less than 3,000 times its own weight of freshly coagulated and disintegrated egg albumin.

(b) It should be not more than slightly hygroscopic.

State the principal solid ingredinets of urine.

Urea, uric acid in the form of urates, and chlorides, sulphates and phosphates of sodium, potassium, calcium, and magnesium.

How would you test urine for sugar?

By Trommer's, Haines', or Fehling's solution. Trommer's test: To the urine add sodium hydrate to alkaline reaction and then copper sulphate solution until a *slight* permanent precipitate is formed. Boil the mixture and in presence of glucose, cuprous hydroxide and oxide are precipitated. Haines' test: Heat 4 C.c. of Haines' solution to boiling and add about eight drops of urine. In presence of sugar a precipitate of cuprous hydroxide and oxide is formed. Fehling's solution is diluted with water, heated to boiling, and the urine added, the reaction being the same as with Trommer's and Haines'.

Give formula for Fehling's solution.

(a) Dissolve 34.67 Gm. of pure crystalline cupric sulphate in water and make solution exactly to 500 C.c. (b) Dissolve

173 Gm. of crystallized potassium and sodium tartrate and 75 Gm. of potassium hydroxide in sufficient water to make exactly 500 C.c. For use, mix equal volumes of a and b. One cubic centimeter of the mixed solution is the equivalent of 0.005 grammes of glucose.

Give the solubility of the following drugs in alcohol and water: (1) Salicylic acid, (2) sodium salicylate, (3) stearic acid, (4) tartaric acid, (5) potassium bitartrate, (6) sodium benzoate, (7) acetanilide, (8) resorcin, (9) sodium phenolsulphonate, (10) zinc phenolsulphonate, (11) benzoic acid, (12) salol.

(1) Salicylic acid, soluble in 308 parts of water, and in two parts of alcohol at 25° C.

(2) Sodium salicylate, soluble in 0.8 part of water, and in 5.5 parts of alcohol at 25° C.

(3) Stearic acid, insoluble in water, soluble in about 16.6 parts of alcohol at 25° C.

(4) Tartaric acid, soluble in 0.71 part of water, and in 1.67 parts of alcohol at 25° C.

(5) Potassium bitartrate, soluble in about 200 parts of water at 25° C.; very sparingly soluble in alcohol.

(6) Sodium benzoate, soluble in 1.6 parts of water and in 43 parts of alcohol at 25° C.

(7) Acetanilide soluble in 179 parts of water, and in 2.5 parts of alcohol at 25° C.

(8) Resorcin, soluble in 0.5 part of water at 25° C., and slightly soluble in alcohol.

(9) Sodium phenolsulphonate, soluble in 4.8 parts of water, and in about 130 parts of alcohol at 25° C.

(10) Zinc phenolsulphonate, soluble in 1.7 parts of water or alcohol at 25° C.

(11) Benzoic acid, soluble in 281 parts of water and in 1.8 parts of alcohol at 25° C.

(12) Salol, soluble in 2333 parts of water, and in 5 parts of alcohol at 25° C.

Give properties of salicylic acid.

It occurs in fine, white, prismatic needles, or as a bulky, white, crystalline powder; odorless, or having a slight gaultheria-like odor with a sweetish, afterwards acrid, taste, and permanent in the air. Soluble in 308 parts of water, and in 2 parts of alcohol at 25° C.; in 14 parts of boiling water, and very soluble in boiling alcohol.

State the solubility of acidum carbolicum in alcohol and in water.

It is very soluble in alcohol, soluble in 19.6 parts of water at 25° C.

TOXICOLOGY AND POSOLOGY.

What is toxicology?

What is a poison?

Give an example of three mineral and three vegetable poisons, their doses and antidotes.

Toxicology is that science which treats of poisons. A poison is a substance which when introduced into the body may cause disease or death, and this as an ordinary result and not by mechanical action.

Examples: Mineral poisons: Arsenic trioxide, average dose, 0.002 Gm. ($^1/_{30}$ grain); antidote, freshly prepared ferric hydroxide. Mercuric chloride, average dose 0.003 Gm. ($^1/_{20}$ grain); antidote, albumen. Lead acetate, average dose 0.065 Gm. (1 grain); antidote, sodium sulphate.

Vegetable poisons: Morphine, average dose 0.010 Gm. ($1/_5$ grain); antidote, atropine. Atropine, average dose 0.0004 Gm. ($^1/_{160}$ grain); antidote, pilocarpine. Digitalis, average dose 0.065 Gm. (1 grain); antidote, nitroglycerin.

Name two narcotic poisons. Dose and antidote for same.

Narcotic poisons: Morphine, average dose 0.010 Gm. ($1/_5$ grain); antidote, atropine. Chloral hydrate, average dose 1 Gm. (15 grains); antidotes, amyl nitrite and strychnine.

Name two irritant poisons. Dose and antidote for same.

Irritant poisons: Arsenic, average dose 0.002 Gm. ($^1/_{30}$ grain); antidote, freshly prepared ferric hydroxide. Antimony and potassium tartrate, average dose 0.005-0.030 Gm. ($^1/_{10}$-$^1/_2$ grain); antidotes, white of egg and tannic acid.

What is an antidote? In giving atropia in case of

poisoning by morphia, what kind of an antidote would it be, and where you give common salt in case of nitrate of silver poison, what kind of an antidote would that be? State difference between the two, if any.

An antidote is a substance introduced into the body to prevent a poison from producing its usual deleterious effect. Atropia, in the case cited, is a physiological antidote. The salt in the second case cited is a chemical antidote. The former acts by virtue of its antagonistic physiological effects; the latter by rendering the silver compound insoluble, and therefore incapable of absorption.

What is an emetic? Mention five emetics that are commonly used. Why should not an emetic be used in poisoning by mineral acids?

An emetic is a substance given to produce vomiting. Five emetics commonly used are apomorphine, mustard, ipecacuanha, zinc sulphate, and copper sulphate. In poisoning by strong mineral acids the mucous membrane is often so injured as to render the use of an emetic dangerous.

What is the antidote for sugar-of-lead, oxalic acid, tartar emetic, carbolic acid, Fowler's Solution, nitrate of silver, strychnine, laudanum, tr. belladonna?

Antidotes for sugar-of-lead — sodium or magnesium sulphate. For oxalic acid — magnesia or chalk. For tartar emetic—tannin or albumen. For carbolic acid—sodium sulphate. For Fowler's Solution—ferric hydroxide. For nitrate of silver—sodium chloride. For strychnine—sodium bromide. For laudanum—atropine. For tr. belladonna—pilocarpine.

What is a narcotic, corrosive and an irritant poison? Give an example of each, also dose, antidote and symptom of poisoning of the same.

A narcotic poison is one affecting the brain nerve-centers. Example: Morphine, average dose 0.010 Gm. (1/5 gr.); antidote, atropine. Symptoms: Drowsiness, stupor, coma, contracted pupils, congestion.

A corrosive poison is one with direct chemical action on the tissues with which it comes in contact. Example: Sulphuric acid, average dose, dilute acid, 2 C.c. (30 minims); antidote, magnesia. Symptoms, great pain, vomiting and prostration.

An irritant poison is one which irritates and inflames the tissues. Example: Arsenic, average dose 0.002 Gm. ($^1/_{30}$ grain); antidote, ferric hydroxide. Symptoms: Nausea, pain, thirst, vomiting and prostration.

Define posology, maximum dose, minimum dose.

Posology is the science of dosage of medicines. The maximum dose is the largest dose consistent with safety. The minimum dose is the smallest dose capable of exerting physiological action.

Define the following: A dose, demulcent, antagonistic, lethal dose.

A dose is the measured portion of medicine to be taken at one time. Demulcent—a substance, usually of a mucilaginous nature, to protect the mucous membranes. Antagonistic is a term applied to a drug that neutralizes the therapeutic effect of another. A lethal dose is one capable of producing death.

Name three vegetable and three mineral emetics, and state the emetic dose of each.

Vegetable emetics: Apomorphine (vegetable origin), 0.0065 Gm. ($^1/_{10}$ grain); ipecacuanha, 1.3 Gms. (20 grains); mustard, 2-8 teaspoonfuls in 8 ounces of tepid water.

Mineral emetics: Copper sulphate, 0.6-2.0 Gms. (10-30 grains); zinc sulphate, 0.6-2.0 Gms. (10-30 grains); tartar emetic, 0.030 Gm. (½ grain).

In poisoning by an unknown substance, what emer-

gency treatment would you employ? Give reason for each antidote you would use.

Remove the poison from the stomach, using a stomach-tube, or give an emetic, such as ipecacuanha or apomorphine. Open the bowels by means of a purgative, such as magnesium sulphate. Give as a chemical antidote magnesia in milk or white-of-egg in milk, or in case the vomited matter is alkaline, give instead of the magnesia a weak acid, such as acetic or citric acid. The magnesia and the albumen have a beneficial action in most cases of poisoning by irritants or corrosives. If the poison is evidently a narcotic, as judged by the symptoms, give tannin or strong, green tea, tannin being a precipitant for most alkaloids. Sustain the heart action and respiration by stimulants as seem required.

Where are emetics contraindicated? Where are oils used? Why are oils and fats contraindicated for phosphorus? What is the chief benefit derived from mucilage?

Emetics may be contraindicated in poisoning by corrosives where the mucous membrane is seriously damaged. Oils are used in alkali poisoning and with other corrosives for their demulcent action. Oils and fats are contraindicated for phosphorus because, by their solvent action, they increase the amout absorbed. Mucilage is useful chiefly for its demulcent action in protecting the mucous membranes; it is a ''mechanical antidote.''

In poisoning by what substances should the use of the stomach tube or stomach pump be avoided? In poisoning by what substances should oils not be given? Give reasons for your answer to this question?

In poisoning by corrosives the stomach-tube should not be used on account of the danger of producing injury to the already weakened mucous membrane. Oils should not be used with poisons soluble in oils, such as phosphorus, the increased solubility increasing the absorption, and therefore the toxic action.

Name five poisonous substances which combine with tannin forming less dangerous compounds. How much tannin would you give as an antidote?

Tartar emetic, colchicum, atropine, digitalis, eserine.

Dose of tannin 0.6-1.3 Gms. (10-20 grains).

Define ptomaine, hypnotic, styptic.

A ptomaine is a chemical substance, alkaloidal in character, produced by the action of bacteria on organic matter.

Hypnotic is that which causes sleep.

A styptic is that which has the property of checking hemorrhage by causing vascular contraction.

Name four demulcents. Define cumulative poison.

Decoction of Iceland moss, gum arabic, mucilage of sassafras pith and slippery-elm bark.

A cumulative poison is one which suddenly exhibits a noteworthy effect after the taking of a number of apparently ineffective doses.

Name the official acids of sulphur, and state the emergency treatment in case of poisoning by them. Should the stomach pump or stomach tube be used in this class of poisons?

The official acids of sulphur are the acidum sulphuricum, acidum sulphuricum aromaticum, acidum sulphuricum dilutum, and acidum sulphurosum.

In poisoning by the strong acids give magnesia in water or milk, flour in milk, demulcent drinks, morphine to allay pain, and hypodermatic stimulants in collapse. When the acid taken has not been sufficiently strong to seriously damage the mucous membrances give the usual emetics.

The stomach-pump or tube are not used in these cases on account of the possibility of further damaging the weakened mucous membranes.

Give the remedy and treatment for poisoning by matches, kerosene, ammonia, lye.

In poisoning by matches the poison to be considered is generally phosphorus. Give copper sulphate as the emetic and antidote. Wash out stomach with one per cent. potassium permanganate and use magnesium sulphate as a purgative.

Kerosene is not, strictly speaking, a poison; if untoward symptoms arise, give an emetic and treat physiologically.

Ammonia taken internally is to be treated with plenty of water and with dilute acids, acetic (vinegar) or citric, white-of-eggs, oils, and demulcent drinks. The laryngeal symptoms may be controlled by inhaling the fumes of hot vinegar. Poisoning by lye is treated as is that by ammonia, though laryngeal symptoms are commonly absent.

State antidotal treatment for poisoning by iodine. By any of the copper salts.

For iodine give emetics and boiled starch or flour paste with water.

For the copper salts give emetics, warm milk with white of egg, magnesia, and potassium ferrocyanide.

What condition or symptoms would indicate poisoning by a corrosive mineral acid? What general antidotal treatment should be employed in such poisoning?

A corrosive mineral acid would be suggested by extreme pain, cold skin, bloody vomiting and collapse. The vomited matter reacting strongly acid. The general antidotal treatment consists in the use of magnesia, as chemical antidote, with demulcent drinks to protect the mucous membranes.

Name the official antidote for poisoning by arsenic. What chemical reaction takes place? How would you identify arsenic in vomit?

The official antidote for arsenic is ferric hydroxide with magnesium oxide. The ferric hydroxide of the antidote combines with the arsenic, forming an insoluble arsenate of iron.

$$2Fe_2(OH)_6 + As_2O_3 = Fe_3(AsO_4)_2 + Fe(OH)_2 + 5H_2O.$$

The most satisfactory chemical test for the detection of arsenic in vomit is the Reinsch. Acidify with pure hydrochloric acid, introduce a strip of bright, clean copper foil, and boil. Should a gray coating form on the copper, remove the copper, dry carefully and heat in an ignition-tube; the arsenical coating will be volatilized and will deposit upon the cooler portion of the tube in the form of crystals of the trioxide.

Give emergency treatment for poisoning by arsenic. How is the official antidote prepared?

Use stomach-tube, administer emetics, give milk with magnesia or white-of-egg, keep body warm.

The special antidote is ferric hydroxide with magnesium oxide, prepared as follows: 40 C.c. of the U. S. P. solution of ferric sulphate are mixed with 125 C.c. water and placed in a large flask. 10 Gms. magnesium oxide are rubbed up with cold water and placed in a second flask with about 750 C.c. of water. For use the magnesium oxide mixture is shaken and added gradually to the diluted solution of ferric sulphate, this mixture being again shaken.

What trace of poison may subnitrate of bismuth contain?

It may contain a trace of arsenic.

Give safe and toxic doses of arsenic. Describe symptoms of poisoning by same, and tell how and what antidote is to be administered.

Arsenic is administered medicinally in doses of 0.001-0.004 Gm. ($^1/_{60}$-$^1/_{15}$ grain). Doses of 0.065-0.130 Gm. (1-2 grains) may be fatal. The symptoms of arsenical poisoning are thirst, pain, vomiting, purging, cramps, skin cold, pulse small, collapse. The special antidote is ferric hydroxide with magnesium oxide, which, when prepared according to the Pharmacopœial directions, is given in doses of 120 C.c. (4 fluid ounces).

Name the official solutions of arsenic. What would be the dose of each corresponding to 1-10 grain of arsenic?

Solution of sodium arsenate, solution of potassium arsenite, solution of arsenous acid, and solution of arsenic and mercuric iodides.

In each case 10 minims would contain approximately $^1/_{10}$ grain of arsenic.

Give the official name of tarter emetic. Name two official preparations in which it is used. Give its adult doses, chemical and physiological antidote.

Official name—antimonii et potassii tartras.

It is used in the official preparations, vinum antimonii and syrupus scillae compositus. Average dose: Expectorant, 0.005 Gm. ($^1/_{10}$ grain); emetic, 0.030 Gm. (½ grain).

Tannic acid is the chemical antidote. There is no true physiological antidote; morphine may be required for the pain, and stimulants for the depression.

State the symptoms, together with the antidote for phosphorus poison?

The symptoms of phosphorus poisoning are: disagreeable taste, thirst, nausea, vomiting, purging; later a jaundiced condition and hemorrhages; sometimes neurotic symptoms, cramps, and convulsions.

Antidote is copper sulphate, which also acts as an emetic. Give also animal charcoal, dilute hydrogen dioxide, inhalation of oxygen or ozone, old oil of turpentine, but no other oils.

Name a mercurial preparation that is most frequently used for suicidal purposes. What is the best antidote in case of poisoning? How would you detect it in vomit?

Mercuric chloride or bichloride of mercury. The best antidote is albumen or white-of-egg, followed by the stomach-pump.

Mercuric chloride is most easily detected in the vomit by the modified Reinsch test. Acidify with pure hydrochloric acid and introduce a strip of bright, clean copper foil. In presence of mercury a gray deposit forms upon the copper, becoming silvery-white on gentle friction.

Give a chemical test for corrosive sublimate.

See modified Reinsch test in answer to preceding question; also, in aqueous solutions, sodium hydroxide gives a yellow precipitate; ammonium hydroxide, a white precipitate, and potassium iodide, a scarlet precipitate.

Give a chemical test for mercurous chloride.

Mercurous chloride, a heavy, white powder, insoluble in water, is turned black on addition of ammonium hydroxide.

Give test for identity of sugar-of-lead, sulphate of zinc, and calomel.

Sugar-of-Lead. Test—Soluble in water. Solutions precipitated by sulphuric acid, white; by potassium chromate, yellow; by hydrogen sulphide, black; by potassium iodide, yellow. To demonstrate that the salt is an acetate, add strong sulphuric acid and warm the mixture; the odor of acetic acid is produced.

Sulphate of Zinc. Test—Sodium hydroxide gives a white precipitate, soluble in excess of reagent. Ammonium sulphide gives a grayish-white precipitate, insoluble in excess. Hydrogen sulphide gives a white precipitate, easily soluble in acids. To demonstrate that the salt is a sulphate, add barium chloride solution; a white precipitate of barium sulphate is formed.

Calomel. Test—See answer to preceding question.

Name the chemical antidote for sugar-of-lead, nitrate of silver, iodine, oxalic acid.

Antidotes — For sugar-of-lead, sodium or magnesium sulphate; for nitrate of silver, common salt, sodium chloride; for iodine, boiled starch or flour-paste and water; for oxalic acid, magnesia or chalk.

Give a chemical test for nitrate of silver.

Sodium chloride solution gives a white, curdy precipitate, insoluble in nitric acid, soluble in ammonium hydroxide.

Would you use one of the following in sulphuric acid poisoning: An emetic, sodium bicarbonate, magnesia, milk? Explain regarding the use of each.

An emetic would be contraindicated in poisoning by strong acid on account of damage to the stomach caused by retching. Sodium bicarbonate is contraindicated, except in dilute small doses, on account of the sudden evolution of carbon dioxide gas. Magnesia or magnesia and milk form the ideal antidotal treatment, the product of the chemical reaction, magnesium sulphate, being in itself advantageous.

Give the antidotes for the following drugs in poisonous doses: (1) Caustic soda, (2) corrosive sublimate, (3) red iodide of mercury, (4) red precipitate, (5) sugar-of-lead, (6) nitrate of silver, (7) ammonia water, (8) phosphorus, (9) rough on rats, (10) iodine.

Antidotes: (1) Vinegar or lemon juice. (2) (3) (4) Albumen or white-of-egg, followed by emetics. (5) Sodium or magnesium sulphate. (6) Common salt, sodium chloride. (7) Vinegar and inhalation of fumes of hot vinegar. (8) Copper sulphate. (9) Ferric hydroxide or ferric hydroxide with magnesium oxide. (10) Boiled starch or flour-paste and water or milk.

Give the antidotes for the following poisons: (1) Mineral acids, (2) caustic alkalies, (3) tartar emetic, (4) arsenic, (5) zinc chloride, (6) phosphorus rat paste.

(1) Weak alkalies, by preference, magnesia. (2) Weak acids, acetic or citric, as in vinegar and lemon juice. (3) Tannic acid. (4) Ferric hydroxide with magnesium oxide. (5) Albumen and milk. (6) Copper sulphate.

Give symptoms and treatment in case of poisoning by sugar-of-lead.

The symptoms of acute poisoning by sugar-of-lead are nausea, burning in the stomach, colic and retching. In the more chronic forms we have anæmia, colic, obstinate constipation, "wrist drop," and palsy. Treatment: Stomach-tube and emetics, magnesium sulphate, sodium sulphate, and potassium iodide.

Describe the toxicology of alkalies, ammonia, iodine, alcohol and iodoform.

The alkalies in concentrated doses produce great pain, vomiting, retching, prostration, and collapse. In treatment give plenty of water with dilute acids, acetic or citric, and olive oil, white-of-egg, etc. Give morphine for the pain, and stimulants as required.

Ammonia is similar to the other alkalies, with pronounced laryngeal symptoms from the irritating vapor. Treat as for other alkalies and give inhalation of acetic acid vapor or of chloroform.

Iodine produces pain, vomiting, purging, full pulse, sometimes an eruption on the skin. In treatment give emetics and boiled starch or flour-paste and water or milk.

Alcohol in acute poisoning produces dyspnœa, dilated pupils, stupor, convulsions, or coma. Treatment: Stomach-tube, emetics, fresh air or oxygen, warmth to body, and strychnia or other hypodermatic stimulant.

Iodoform produces depression, sometimes mild delirium, rapid pulse, high temperature, and possibly collapse. Treatment: Remove the cause and treat symptoms. There is no special antidote nor is one required.

Give the antidote for the following poisons: (1) Oxalic acid, (2) carbolic acid, (3) formaldehyde, (4) nux vomica, (5) resorcin, (6) stramonium, (7) opium, (8) chloroform, (9) cyanide of potassium, (10) creosote.

(1) Magnesia or chalk. (2) Sodium sulphate and alcoholic drinks. (3) Solution of ammonium acetate. (4) Potassium bromide, tannic acid. (5) Same as for (2). (6) Pilocarpine nitrate, and morphine. (7) Potassium perman-

ganate, and atropine. (8) Sodium carbonate, and stimulants. (9) Hydrogen dioxide. (10) Same as for (2).

Give antidotes for the following drugs when taken in poisonous doses: (1) Acetanilide, (2) aconite or aconitine, (3) antipyrine, (4) bromalhydrate, (5) brucine, (6) chloral hydrate or chloroform, (7) cocaine.

(1) Strychnine, hypodermatically. (2) Atropine and nitroglycerine. (3) Strychnine. (4) Sodium carbonate and hypodermatic stimulants. (5) Potassium bromide. (6) Same as for (4). (7) Amylnitrite, tannin, and strychnine.

What are the symptoms and treatment in case of poisoning by camphor, carbolic acid, nux vomica, laudanum, oxalic acid, oil pennyroyal, chloral hydrate, aconite?

Camphor in sufficient dose may produce delirium and convulsions. Treatment: Emetics, and purgative, and brandy.

Carbolic acid produces faintness, pallor, contracted pupils, feeble pulse, stertorous breathing, coma, urine which darkens on exposure. Treatment: Sodium sulphate or magnesium sulphate, white-of-egg, brandy, dilute acetic acid or vinegar, followed by emetics.

Nux vomica may produce restlessness, twitching, tetanic convulsions generally with opisthotonos, followed by periods of relaxation. Treatment: Emetics, plenty of water, tannin, potassium bromide, amyl nitrite, darkened room.

Laudanum produces sense of weight in limbs, drowsiness, coma, pupils contracted, labored breathing, feeble pulse, skin generally warm. Treatment: Stomach-tube, emetics, potassium permanganate, atropine.

Oxalic acid produces pain and tenderness, thirst, vomiting, and depressed heart; sometimes convulsions. Treatment: Magnesia or chalk in milk, saccharated lime, castor oil and stimulants.

Oil pennyroyal produces no characteristic toxic symptoms; if required, an emetic may be administered and atropine given hypodermatically.

Chloral hydrate may produce vomiting, the more serious symptoms, however, are in the heart depression and coma. Treatment: Use stomach-tube or emetics, and give stimulants of brandy, strychnine and atropine.

Aconite produces numbness, tingling, depression of heart and respiratory centers, and paralysis. Treatment: Emetics, atropine or strychnine, inhalation of amyl nitrite. Keep patient in a recumbent position.

What emergency treatment should be used in case of poisoning by carbolic acid?

See in answer to preceding question.

Name an oxidizing agent used in case of poisoning by morphine. Explain how it should be used.

Potassium permanganate, about 10 grains in 8 ounces of water, repeating dose in one-half hour, or add the permanganate to the water used in washing the stomach.

Give a chemical test of identity for morphine; for quinine.

Test for Morphine: Concentrated nitric acid dissolves the alkaloid, with the production of a red color which is not turned to a purple on addition of stannous chloride.

Test for Quinine: To 1 C.c. of the aqueous solution containing just enough sulphuric acid to effect solution, add 2 C.c. bromine T. S. and 1 C.c. ammonia water; an emerald-green color will be produced.

In morphine poisoning what alkaloid may be given for its physiological effect? Name the chemical antidote for morphine?

The physiological antidote is atropine. The chemical antidote is potassium permanganate.

Describe the symptoms and state the emergency treatment which should be employed for poisoning by bella-

donna. For poisoning by oxalic acid. By what chemical test would you distinguish oxalic acid from Epsom salts?

Belladonna produces a flushed face, dilated pupils, contraction of the throat, excitement and delirium. Treatment: Emetics, pilocarpine nitrate, and morphine.

Oxalic acid produces pain and tenderness, thirst, vomiting, weak heart, and sometimes convulsions. Treatment: Magnesia or chalk in milk, saccharated lime, castor oil and stimulants.

Oxalic acid is distinguished from epsom salts by its acid reaction and by effervescing with sodium carbonate. Epsom salts with sodium carbonate produces a white precipitate but no effervescence.

How would you identify carbolic acid other than by the sense of smell? If one ounce of carbolic acid be diluted with a pint of water and taken at one dose, would its action be fatal? Explain.

Carbolic acid may be identified by the fact that it coagulates albumen and collodion and gives an amethyst blue with dilute ferric chloride solution. In the diluted state described, one ounce of carbolic acid would probably not be fatal, though it might produce serious systemic effects. The action of carbolic acid is two-fold, its local action, produced by the strong solutions only, and its systemic action, produced by the carbolic acid absorbed into the blood.

What symptoms would lead you to suspect poisoning by strychnine? What emergency treatment would be employed? Give a chemical test for strychnine.

The symptoms suggestive of strychnine poisoning are as follows: Restlessness, twitching, tetanic convulsions, the body being bent backward and rigid. Muscles all set rigid, then periods of relaxation, followed by a return of the convulsions.

Treatment: Emetics, with plenty of water, tannin, potassium bromide, amyl nitrite; keep patient quiet and in a darkened room.

Test: Dissolve the alkaloid in a few drops of concentrated sulphuric acid on a watch-glass and drag through the solution, by means of a glass rod, a small crystal of potassium dichromate. A succession of colors is produced—dark blue, purple, cherry-red, and reddish-yellow.

Name the symptoms by which you would be able to recognize poisoning by the following drugs. Also give the antidotes in each case. (1) Antipyrine, (2) cocaine, (3) colchicum, (4) colocynth, (5) morphine.

(1) Antipyrine presents no characteristic symptoms; in large doses it depresses the heart's action and produces a peculiar livid discoloration of the surface. Treatment: Strychnine, brandy, recumbent position.

(2) Cocaine produces faintness, dizziness, weak pulse, delirium or coma, sometimes paralysis. Treatment: Stomach-tube, emetics, tannin, amyl nitrite, and strychnine.

(3) Colchicum produces thirst, vomiting, purging, exhaustion. Treatment: Tannin, emetics, morphine.

(4) Colocynth is similar to colchicum, with more painful colic. Treatment: Same as for colchicum.

(5) Morphine produces sense of weight in limbs, drowsiness, increasing coma, pupils contracted, labored breathing, feeble pulse, skin generally warm. Treatment: Stomach-tube, emetic, potassium permanganate, atropine.

Describe the symptoms of poisoning by acetanilide. Name three substances which would act as physiological antidotes in poisoning by it.

Pronounced weakness, skin livid, heart depressed, possibly coma and collapse. Three substances acting, in part at least, as physiological antidotes are brandy, strychnine, and atropine.

Name the chemical antidote for hydrocyanic acid?

Mention antidotes and tell how administered for poisoning by arnica, by phytolacca.

The chemical antidote for hydrocyanic acid is hydrogen dioxide. For arnica poisoning give strychnine or atropine, hypodermatically. For phytolacca poisoning give an emetic, an alcoholic stimulant by the mouth, and strychnine or atropine hypodermatically.

Digitalis: Give the dose, part used, medicinal properties, chemical antidote and an antagonist.

Dose, 0.065 Gm. (1 grain). Part used, the leaves. Used as a heart stimulant and diuretic. Tannic acid acts as both chemical and physiological antidote. Saponine is the best antagonist. Morphine and aconite are antagonists to a lesser degree.

What emergency treatment should be employed for poisoning by illuminating gas?

Artificial respiration, fresh air, oxygen, ozone, friction, brandy hypodermatically.

Give the official name and dose of (1) calabar bean, (2) dog button, (3) hemlock, (4) Indian hemp, (5) chloral hydrate, (6) deadly night-shade, (7) arsenic, (8) colchicum seed, (9) lobelia, (10) stramonium leaves.

(1) Physostigma, 0.100 Gm. (1½ grains). (2) Nux vomica, 0.065 Gm. (1 grain). (3) Conium, 0.200 Gm. (3 grains). (4) Cannabis indica, 0.065 Gm. (1 grain). (5) Hydrated chloral, 1 Gm. (15 grains). (6) Belladonna, leaves, dose 0.065 Gm. (1 grain). (7) Arsenic trioxide, 0.002 Gm. ($^1/_{30}$ grain). (8) Colchicum seed, 0.200 Gm. (3 grains). (9) Lobelia, 0.500 Gm. (7½ grains). (10) Stramonium, 0.065 Gm. (1 grain).

What is the dose of acetate of potash? Oil of eucalyptus? Menthol? Fluidextract of rhus glabra?

Acetate of potash, 2 Gms. (30 grains). Oil of eucalyptus, 0.5 C.c. (8 minims). Menthol, 0.065 Gm. (1 grain). Fluidextract of rhus glabra, 1 C.c. (15 minims).

Give the average adult dose of the following drugs: (1) arsenic, (2) apomorphine hydrocloride, (3) argenti nitras, (4) argenti oxidum, (5) atropinae sulphas, (6) elaterin, (7) hydrocyanic acid diluted, (8) hyoscine hydrobromide, (9) morphine acetate, (10) strychninae sulphas.

(1) Arsenic, 0.002 Gm. ($^{1}/_{30}$ grain). (2) Apomorphine hydrochloride. emetic dose. 0.005 Gm. ($^{1}/_{10}$ grain). (3) Argenti nitras, 0.010 Gm. (⅕ grain). (4) Argenti oxidum, 0.065 Gm. (1 grain). (5) Atropinae sulphas, 0.0004 Gm. ($^{1}/_{160}$ grain). (6) Elaterin, 0.005 Gm. ($^{1}/_{10}$ grain). (7) Diluted hydrocyanic acid, 0.1 C.c. (1½ minims). (8) Hyoscine hydrobromide, 0.0005 Gm. ($^{1}/_{128}$ grain). (9) Morphine acetate, 0.015 Gm. (¼ grain). (10) Strychninae sulphas, 0.001 Gm. ($^{1}/_{64}$ grain).

State the dose of Fowler's Solution, tincture of iodine, tincture of hyoscyamus, tincture of nux vomica.

Fowler's Solution, 0.2 C.c. (3 minims). Tincture of iodine, 0.1 C.c. (1½ minims). Tincture of hyoscyamus, 2 C.c. (30 minims). Tincture of nux vomica, 0.6 C.c. (10 minims).

What is the dose of heroin, elaterium, manganese binoxide, paraldehyde?

Heroin, 0.006 Gm. ($^{1}/_{10}$ grain). Elaterium, 0.005 Gm. ($^{1}/_{10}$ grain). Manganese binoxide, 0.250 Gm. (4 grains). Paraldehyde, 2 C.c. (30 minims).

What is the dose of corrosive sublimate, salol, salicylate of soda, infusion of digitalis?

Corrosive sublimate, 0.003 Gm. ($^{1}/_{20}$ grain). Salol or phenyl salicylate, 0.500 Gm. (7½ grains). Salicylate of soda, 1 Gm. (15 grains). Infusion of digitalis, 8 C.c. (2 fluid drachms).

State the dose of fluidextract of ergot, methyl salicylate, gallic acid, podophyllum.

Fluidextract of ergot, 2 C.c. (30 minims). Methyl salicylate, 1 C.c. (15 minims). Gallic acid, 1 Gm. (15 grains). Podophyllum, 0.500 Gm. (7½ grains).

What is the dose of acetanilide, croton oil, Donovan's Solution, potassium chlorate?

Acetanilide, 0.250 Gm. (4 grains). Croton oil, 0.05 C.c. (1 minim). Donovan's Solution, 0.1 C.c. (1½ minims). Potassium chlorate, 0.250 Gm. (4 grains).

What is the dose of aconite, ammonium carbonate, arsenous acid, atropine sulphate?

Aconite, 0.065 Gm. (1 grain). Ammonium carbonate, 0.250 Gm. (4 grains). Arsenous acid, 0.002 Gm. (1/30 grain). Atropine sulphate, 0.0004 Gm. (1/160 grain).

What is the dose of aromatic spirits of ammonia, compound spirit of ether, mercurous chloride, extract of nux vomica, sodium phosphate?

Aromatic spirits of ammonia, 2 C.c. (30 minims). Compound spirits of ether, 4 C.c. (1 fluid drachm). Mercurous chloride, as laxative, 0.125 Gm. (2 grains); as alterative, 0.065 Gm. (1 grain). Extract of nux vomica, 0.015 Gm. (¼ grain). Sodium phosphate, 2 Gms. (30 grains).

What is the dose of ferrous sulphate, ichthyol, potassium bromide, wine of colchicum seed?

Ferrous sulphate, 0.200 Gm. (3 grains). Ichthyol, 0.2 C.c. (3 minims). Potassium bromide, 1 Gm. (15 grains). Wine of colchicum seed, 2 C.c. (30 minims).

State the dose of benzoic acid, potassium permanganate, fluidextract of cimicifuga, spirit of chloroform.

Benzoic acid, 0.500 Gm. (7½ grains). Potassium permanganate, 0.065 Gm. (1 grain). Fluidextract of cimicifuga, 1 C.c. (15 minims). Spirit of chloroform, 2 C.c. (30 minims).

State the dose of James' Powder, oil of peppermint, salicylic acid, sodium bromide.

James' Powder, 0.200 Gm. (3 grains). Oil of peppermint, 0.2 C.c. (3 minims). Salicylic acid, 0.500 Gm. (7½ grains). Sodium bromide, 1 Gm. (15 grains).

State the dose of extract of aconite, tincture of digitalis, phosphorus, codeine.

Extract of aconite (U. S. P. 1890), 0.010 Gm. (⅙ grain). Tincture of digitalis, 1 C.c. (15 minims). Phosphorus, 0.0005 Gm. ($^{1}/_{128}$ grain). Codeine, 0.030 Gm. (½ grain).

How much sulphate of morphine would a patient get in two official troches of morphine and ipecac? Would this be a large or small dose?

The patient would receive 0.0032 Gm. ($^{1}/_{20}$ grain).
A small dose.

What is the hypodermic dose of morphine, strychnine? What is the rectal dose of extract of belladonna, extract of opium?

Morphine, 0.010 Gm. (⅕ grain). Strychnine, 0.001 Gm. $^{1}/_{64}$ grain). Extract of belladonna, rectal dose, 0.020 Gm. (⅓ grain). Extract of opium, rectal dose, 0.050 Gm. (¾ grain).

Give the safe and toxic doses of fluidextract gelsemium, aconite, foxglove, belladonna, henbane, arnica and strophanthus.

Fluidextract of gelsemium: Average dose, 0.05 C.c. (1 minim); toxic dose, possibly fatal, 4 C.c. (1 fluid drachm).

Aconite: Average dose, 0.065 Gm. (1 grain); toxic, probably fatal, dose, 3.8 Gms. (1 drachm).

Foxglove: Average dose, 0.065 Gm. (1 grain); toxic dose, 0.650 Gm. (10 grains).

Belladonna: Average dose, 0.065 Gm. (1 grain); toxic dose, 0.650 Gm. (10 grains).

Henbane: Average dose, 0.250 Gm. (4 grains); toxic dose, about 2.5 Gms. (40 grains), the fatal dose is not known.

Arnica: Average dose, 1 Gm. (15 grains); toxic dose, possibly about 10 Gms. (150 grains).

Strophanthus: Average dose, 0.065 Gm. (1 grain); toxic dose, 0.650 Gm. (10 grains).

State doses of physostigmine, iodine, prussic acid, carbolic acid, silver nitrate.

Physostigmine, 0.001 Gm. ($^{1}/_{64}$ grain). Iodine, 0.005 Gm. ($^{1}/_{10}$ grain). Prussic acid, official, dilute, 0.1 C.c. (1½ minims). Carbolic acid, 0.065 Gm. (1 grain). Silver nitrate, 0.010 Gm. (⅕ grain).

State doses of napthol, orphol, pyridine, euquinine, duotal.

Napthol (beta naphthol), 0.25 Gm. (4 grains). Orphol, 0.30 Gm. (5 grains). Pyridine, 0.3 C.c. (5 minims). Euquinine, 0.25 Gm. (4 grains). Duotal, or Guaiacol carbonate, 1 Gm. (15 grains).

What is the dose of morphine sulphate, codeine sulphate, colchicine, bismuth subnitrate, sparteine sulphate?

Morphine sulphate, 0.015 Gm. (¼ grain). Codeine sulphate, 0.030 Gm. (½ grain). Colchicine, 0.0005 Gm. ($^{1}/_{128}$ grain). Bismuth subnitrate, 0.500 Gm. (7½ grains). Sparteine sulphate, 0.010 Gm. (⅕ grain).

What is the dose of tincture of aconite, extract of belladonna, extract of stramonium, fluidextract of valerian?

Tincture of aconite, 0.6 C.c. (10 minims). Extract of belladonna, 0.010 Gm. (⅕ grain). Extract of stramonium, 0.010 Gm. (⅕ grain). Fluidextract of valerian, 2 C.c. (30 minims).

What is the dose of methylene blue, sulphonal, tinctura opii, sodium sulphate, tincture of capsicum, tincture of belladonna?

Methylene blue, 0.250 Gm. (4 grains). Sulphonal, 1 Gm.

(15 grains). Tinctura opii, 0.5 C.c. (8 minims). Sodium sulphate, 16 Gms. (240 grains). Tincture of capsicum, 0.5 C.c. (8 minims). Tincture of belladonna, 0.5 C.c. (8 minims).

What is the dose of tincture of colchicum seed, tincture of ferric chloride, potassium iodide, wine of antimony, syrup of squill?

Tincture of colchicum seed, 2 C.c. (30 minims). Tincture of ferric chloride, 0.5 C.c. (8 minims). Potassium iodide, 0.500 Gm. (7½ grains). Wine of antimony, 1 C.c. (15 minims). Syrup of squill, 2 C.c. (30 minims).

What is the dose of aloin, chloral, ammonium chloride, Lugol's Solution, mixture of rhubarb and soda?

Aloin, 0.065 Gm. (1 grain). Chloral, 1 Gm. (15 grains). Ammonium chloride, 0.500 Gm. (7½ grains). Lugol's Solution, 0.2 C.c. (3 minims). Mixture of rhubarb and soda, 4 C.c. (1 fluid drachm).

What is the hypodermic dose of morphine sulphate, strychnine sulphate?

Morphine sulphate, 0.015 Gm. (¼ grain). Strychnine sulphate, 0.001 Gm. (1/64 grain).

What is the dose of tincture of ignatia, cocaine hydrochloride, guaiacol, carbonate of guaiacol, orthoform, aspirin, trional?

Tincture of ignatia, 1 C.c. (15 minims). Cocaine hydrochloride, 0.030 Gm. (½ grain). Guaiacol, 0.5 C.c. (8 minims). Carbonate of guaiacol, 1 Gm. (15 grains). Orthoform, 0.500 Gm. (7½ grains). Aspirin, 1 Gm. (15 grains). Trional, 1 Gm. (15 grains).

What is the dose of phenacetine, fluidextract nux vomica, aristol, Huxham's Tincture, Friar's Balsam?

Phenacetine (acetphenitidin), 0.500 Gm. (7½ grains). Fluidextract nux vomica, 0.05 C.c. (1 minim). Aristol (thymol iodide) is not recommended for internal administration;

it has been used in suppository, 0.20 Gm. (3 grains). Huxham's Tincture (compound tincture of cinchona), 4 C.c. (1 fluid drachm). Friar's Balsam (compound tincture of benzoin), 2 C.c. (30 minims).

Give doses of the following: Antipyrin, antikamnia, ammonol, bismuth valerianate, bismuth salicylate, orexin, papain, pyoktanin.

Antipyrin, 0.650 Gm. (10 grains). Antikamnia, 0.320 Gm. (5 grains). Ammonol, 0.320 Gm. (5 grains). Bismuth valerianate, 0.032 Gm. (½ grain). Bismuth salicylate (bismuth subsalicylate), 0.250 Gm. (4 grains). Orexin, 0.25 Gm. (4 grains). Papain, 0.130 Gm. (2 grains). Pyoktanin, 0.065 Gm. (1 grain).

Give your own rule for doses. State difference in doses when given hypodermatically, by the mouth, and by the rectum?

The Pharmacopœia gives the average adult dose. To determine the dose for children, divide the age by the age plus twelve, the result represents the fraction of the adult dose suitable for the child. For hypodermatic use the dose is ordinarily about one-half of that given by the mouth; for rectal use, about one and a half times that by the mouth.

State rule for giving medicine to children and give an example.

Divide the age by the age plus twelve; the result represents the fraction of the adult dose suitable for the child. Example: If the adult dose be one grain, for a child of three years of age it would be $\frac{3}{3+12} = \frac{1}{5}$ grain. In case of powerful narcotics, children will require about two-thirds of this proportion.

What is the dose of the following for a child five years old: Syrup ipecac, tincture of aconite, santonine, pulv. glycerrhizae compositum, tinctura opii comp.

Syrup ipecac, emetic dose, 5 C.c. (80 minims); expectorant, 0.32 C.c. (5 minims). Tincture aconite, 0.20 C.c. (3 minims). Santonine, 0.21 Gm. (1/3 grain). Pulv. glycyrrhizae comp., 1.3 Gm. (20 grains). Tinct. opii comp., 1 C.c. (15 drops).

What is the dose for a child one year old: Calomel, tincture aconite, salol, bismuth subnit., tinctura opii?

Calomel, laxative, 0.012 Gm. (1/5 grain); alterative, 0.006 Gm. (1/10 grain). Tincture aconite, 0.05 C.c. (3/4 minim). Salol, 0.05 Gm. (3/4 grain). Bismuth subnit., 0.05 Gm. (3/4 grain). Tinctura opii, 0.025 C.c. (2/5 minim).

What proportion of the adult dose of a medicine should be ordinarily given at the following ages: 1, 3, 7, 10, 16, 80?

Following the general rule, which, however, must be modified according to the particular medicine to be administered, the proportions would be about as follows, in order named: one-thirteenth, one-fifth, one-third, one-half, four-sevenths, eight-ninths.

BOTANY.

State what is meant by the following terms: (1) Annual, (2) biennial, (3) perennial.

The herb which terminates with the season or which springs from the seed, blossoms, ripens its fruit and dies completely all in the same season is called an *annual;* if, however, the stem dies, but the underground parts retain their vitality, and growth is continued another season, during which the seeds are perfected, and it then dies completely, it is called a *biennial;* and if, by underground parts, the life of the plant is continued indefinitely through a period of years, it is called a *perennial.*

Describe aerial roots.

These are the main roots of plants which live in the air and are not in contact with the earth.

Describe aerial rootlets.

These are the secondary roots of the same plants.

What is meant by epiphytic plants?

Plants which live in the air and derive sustenance from it.

Parasitic plants?

These are plants which live upon another and derive their sustenance from it.

What is the meaning of phenogamous?

Having flowers with stamens and pistils and producing seed.

What kind of a plant is the mistletoe?

Partially parasitic and partially epiphytic.

What would you call the dodder?

Completely parasitic.

Give the meaning of the following terms as applied to stems: (1) Assurgent, (2) decumbent, (3) procumbent, (4) repent, (5) surculus, (6) stolon, (7) flagellum, (8) suffruticose, (9) dextrorse, (10) sinistrorse.

(1) Assurgent means ascending. (2) Creeping along the ground. (3) Lying wholly on the ground. (4) Creeping along the ground, rooting as they grow. (5) Another name for sucker. (6) Prostrate or declined branch, the end of which, on coming in contact with the soil, takes root and ultimately gives rise to a new plant. (7) Dry, slender, whip-like. (8) A stem of small size and woody at the base. (9) A stem which grows toward the right or toward the sun. (10) Sinistrorse, towards the left or away from the sun.

State which of the following official vegetable drugs are classed as roots, rhizomes, tubers, bulbs or corms: (1) Stillingia, (2) sumbul, (3) calumba, (4) aspidium, (5) calamus, (6) jalap, (7) colchicum, (8) scilla, (9) rheum, (10) ipecacuanha.

(1) Root. (2) Rhizome and roots. (3) Root. (4) Rhizome. (5) Rhizome. (6) Tuber. (7) Corm. (8) Bulb. (9) Bulb. (10) Root.

Give the meaning of the following words as applied to Botany: (1) Cryptogamous, (2) dicotyledonous, (3) monocotyledonous, (4) angiospermous, (5) polypetalous, (6) monopetalous, (7) apetalous, (8) spadicious, (9) acrogenous.

(1) Any flowerless plant. (2) Possessing two seed-leaves. (3) Possessing one seed-leaf. (4) Seeds enclosed in a seed-

case. (5) Possessing many petals; applied to flowers having the petals distinct or un-united. (6) Possessing one petal; applied to flowers having petals more or less united. (7) Having no petals. (8) Furnished with a spathe or bract. (9) A plant that grows at apex only.

What is a fruit?

The fruit consists of the ripened pistil or pistils, but it may also include other organs which are included in the process of development.

Describe a utricle.

This is a one-seeded fruit whose pericarp is bladdery and fits the seed loosely—chenopodium.

Describe a samara.

This is a one-seeded fruit that possesses a wing-like appendage, such as the ash, elm, and maple.

Describe a cremocarp.

This is a peculiar double fruit produced by umbelliferous plants.

Describe a drupe.

This is a one-carpelled fruit like that of the plum, cherry and peach.

Describe a hesperidium.

This is a fruit like the orange, lemon and lime; it resembles a superior berry, but differs in having a leathery rind containing numerous oil glands.

Describe a follicle.

This is a one-carpelled dry fruit which dehisces along the ventral suture, as the columbine.

Describe a legume.

This differs from a follicle only in the fact that the dehiscence takes place along the dorsal as well as the ventral suture, forming two halves, as the pea pod.

Describe a galbulus.

This is a cone, the scales of which have become succulent, such as the juniper berry.

Describe a sorosis.

This is a fruit where the inflorescence in ripening has become fused together into a compact mass, such as the mulberry and pineapple.

Give the botanical names of the following drugs: (1) Wormwood, (2) pleurisy root, (3) calamus, (4) blue cohosh, (5) Irish moss, (6) Iceland moss, (7) pumpkin seed, (8) poke root, (9) wild cherry, (10) blackberry.

(1) Artemisia absinthium. (2) Asclepias tuberosa. (3) Acorus calamus. (4) Caulophyllum thalictroides. (5) Chondrus crispus. (6) Cetraria islandica. (7) Cucurbita pepo. (8) Phytolacca decandra. (9) Prunus serotina. (10) Rubus villosus, Rubus nigrobaccus, or Rubus cuneifolius.

Give the common names of the following drugs: (1) Zea mays, (2) viburnum opulus, (3) viburnum prunifolium, (4) arctostaphylos uva-ursi, (5) delphinium staphisagria, (6) spigelia marilandica, (7) brassica alba, (8) aristolochia reticulata, (9) cassia acutifolia, (10) artemisia pauciflora.

(1) Corn starch. (2) Cramp bark. (3) Black haw. (4) Bear berry. (5) Stavesacre. (6) Pink root. (7) Yellow mustard. (8) Virginia snake-root. (9) Senna. (10) Levant worm-seed.

State which of the following drugs are classified as roots, rhizomes, bulbs, corms, fruits, seeds or flowers: (1) Colchicum root, (2) American wormseed, (3)

Levant wormseed, (4) sarsaparilla, (5) squill, (6) ipecac, (7) calamus, (8) anise, (9) white mustard, (10) elder.

(1) Corm. (2) Fruit. (3) Flower heads. (4) Root. (5) Bulb. (6) Root. (7) Rhizome. (8) Fruit. (9) Seed. (10) Flower.

What is a loment?

This is a modification of the legume, which instead of dehiscing longitudinally breaks up transversely into segments, as the fruit of the sanfoin.

What is a caryopsis?

This resembles the akene except that the pericarp closely adheres to the seed, as wheat, corn and oats.

What is a rhizome?

A rhizome is a creeping underground stem which grows horizontally or obliquely, is more or less scaly or marked with the scars of scales, sends off roots usually more abundantly from the under surface, and commonly has its upper surface more or less distinctly marked with the scars of the bases of aerial stems of previous years.

How does a rhizome differ from a root?

Rhizomes bear scales or scale-scars, in the axils of which buds not infrequently occur, whilst roots do not. In addition the growing point of a rhizome is at the apex, whilst in a root it is back of it.

Give the names of two official rhizomes?

Aspidium and calamus.

What is a tuber?

A tuber is a short and excessively thickened underground stem, born usually at the end of a slender, creeping branch.

Is it a root or stem?

Stem.

Name one official tuber.

Aconitum.

What is a corm?

This is an excessively thickened, erect, underground stem, covered with thin leaf-scales on the surface.

What is a bulb?

This is an excessively thickened, short, erect stem, covered with fleshy scales, which constitute its principal bulk.

What is the difference between a corm and a bulb?

A corm has thin leaf-scales, which do not represent its bulk, whilst a bulb has fleshy scales which do.

Name one official bulb and corm.

Bulb is squill; corm is colchicum.

Describe (1) linear, (2) lanceolate, (3) oblong, (4) eliptical, (5) ovate, (6) cordate, (7) oblanceolate, (8) spatulate, (9) sagittate, (10) palmate or digitate. Make a drawing of each.

(1) Linear, a narrow, elongated form with parallel margin.

(2) Lanceolate or lance shape.

(3) Oblong, a broad leaf, but longer than wide, with sides nearly parallel and ends rounded.

(4) Elliptical, somewhat larger than wide with rounded ends and sides.

(5) Ovate, shaped like longitudinal section of a hen's egg and has petiole at larger end.

(6) Cordate or heart-shaped.

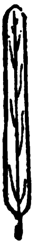
(7) Oblanceolate or inversely lance-shaped.

(8) Spatulate, larger and rounded at apex, tapering at the base.

(9) Sagittate, arrow-shaped.

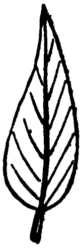
(10) Palmate, extending from a common center or radiating from top of petiole.

1.



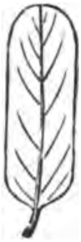
Linear.

2.



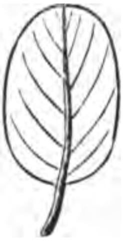
Lanceolate.

3.



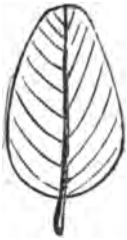
Oblong.

4.



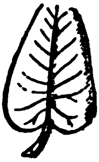
Elliptical.

5.



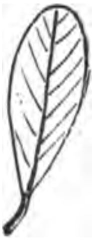
Ovate.

6.



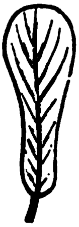
Cordate.

7.



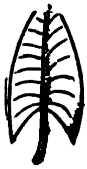
Oblanceolate.

8.



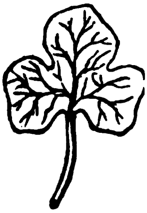
Spatulate.

9.



Sagittate.

10.



Palmate.

Which of the above forms correspond with that of the buckeye leaf?

No. 10, palmate, the buckeye being palmately septemfoliate.

Describe (1) raceme, (2) corymb, (3) umbel, (4) spike, (5) capitulum, (6) spadix.

(1) Raceme. This is a cluster in which the flowers are pedicelled and occur in succession along a lengthened axis, blossoming from base toward the apex.

(2) Corymb. This resembles a raceme except that the rachis is proportionately shorter and the lower pedicel lengthened so as to bring all the flowers to about the same level.

(3) Umbel. This likewise resembles the raceme, but has the rachis reduced still more than in the corymb, and the

nearly equal pedicels radiate from it like the rays of an umbrella.

(4) Spike. This is like the raceme except that the flowers are sessile instead of pedicelled.

(5) Capitulum, or head, is like a spike except that it has the rachis shortened so as to form a very compact cluster of sessile or nearly sessile flowers.

(6) Spadix. This is a flower-cluster, like the spike, that is partially or wholly enclosed in a large bract, called a spathe, which springs from its base.

Describe (1) calyx, (2) corolla, (3) stamen, (4) pistil.

A complete flower consists of four sets of modified leaves constituting as many different organs. The outer set, or whorl, called the calyx, composed of individual pieces called sepals. The second set, called the corolla, made up of individual pieces called petals. The third set, called the andrœcium, made up of individual pieces called stamens. The fourth, or central set, called the gynæcium, made up of individual pieces called pistils.

Define the following: (1) Fecula, (2) sclerotium, (3) fruit, (4) seed, (5) drupe, (6) root.

(1) Fecula. This signifies the starchy portion of a seed.

(2) Sclerotium. This is the botanical name for the grain of ergot which displaces the head of rye, and it consists wholly of a hard and compact mass of mycelium, and contains no part of the original grain of rye.

(3) Fruit. This consists essentially of the ripened pistil or pistils, but it may also include other organs which grow fast to it in the process of their development.

(4) Seed. This is the fertilized and ripened ovule.

(5) Drupe. This is a one-carpelled fruit, like that of the plum, cherry and peach.

(6) Root. This is that part of the plant-axis which does not bear leaves.

Describe a typical flower.

The parts of a typical flower, when represented as separated in their order from the receptacle, are: A whorl of three pistils, the gynæcium; a whorl of three stamens, the andrœcium; a whorl of three petals, the corolla; a whorl of three sepals, the calyx; the receptacle or shortened axis on which all these parts are inserted; a bract below the flower.

What is the use of a flower?

It takes part in the reproductive function of the plant.

Name some cryptogamous plants.

Aspidium, lycopodium.

Define the following terms: (1) Pinnate, (2) sessile, (3) dehiscent, (4) herbaceous, (5) dentate, (6) inflorescence.

(1) Pinnate. Applied to compound leaves when the leaflets are laterally arranged along a lengthened axis.

(2) Sessile. Not stalked, inserted directly on the axis, as when a leaf body is attached directly to a stem.

(3) Dehiscent. The act of splitting open applied to the splitting open of anthers, to shed their pollen of antheridia, to set free their antherozoids, of sporangia to shed their spores and of certain fruits to shed their seed.

(4) Herbaceous. Applied to stems which die down to the ground at the close of a season.

(5) Dentate. Applied to leaves or other flattened organs that have their margins toothed with acute teeth that point perpendicularly outward from the margin.

(6) Inflorescence. The arrangement of flowers in clusters.

THE PREPARATION OF PERCENTAGE SOLUTIONS.*

To make one pint of a—

$\frac{1}{50}$	per cent. solution,	(1 in 5000,)	dissolve	1½	grains.
$\frac{1}{20}$	per cent. solution,	(1 in 2000,)	dissolve	2⅔	grains.
$\frac{1}{10}$	per cent. solution,	(1 in 1000,)	dissolve	7⅓	grains.
¼	per cent. solution,	(1 in 400,)	dissolve	18¼	grains.
½	per cent. solution,	(1 in 200,)	dissolve	36½	grains.
1	per cent. solution,	(1 in 100,)	dissolve	73	grains.
2	per cent. solution,	(1 in 50,)	dissolve	146	grains.
4	per cent. solution,	(1 in 25,)	dissolve	292	grains.
5	per cent. solution,	(1 in 20,)	dissolve	365	grains.
10	per cent. solution,	(1 in 10,)	dissolve	730	grains.

Examples:—To make one pint of a 1 in 2000 mercuric chloride solution, dissolve 2⅔ grains of mercuric chloride in one pint of water.

To make one pint of a 2 per cent. sodium nitrate solution, dissolve 146 grains of sodium nitrate in one pint of water. To make one quart of the same solution, dissolve 292 grains in one quart of water.

To make one fluid ounce of a 1 per cent. silver nitrate solution, dissolve $4.\dot{5}$ grains (73 ÷ 16) of silver nitrate in one fluid ounce of water.

To form a mixture of certain percentage from two solutions of different percentages. The difference between the percentage desired and the percentage of one of the solutions, will give the amount of the other solution to be included in the mixture. *Example.*—Required the proportionate amounts of two solutions, containing 7 and 18 per cent. respectively, to make a mixture containing 16 per cent.

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* From Platt's Medical Chemistry.

18 — 16 = 2 parts of the 7 per cent. solution.
16 — 7 = 9 parts of the 18 per cent. solution.

DILUTION OF ALCOHOL. A = percentage strength of the stronger alcohol; B = percentage strength desired. Add to B parts of the stronger alcohol, sufficient water to make A parts of the more dilute. *Example.*—To make 30 per cent. alcohol from 94 per cent. alcohol, add to 30 parts of the 94 per cent. alcohol sufficient water to make in all 94 parts.

To make a definite quantity of the weaker alcohol: Multiply the required strength by the required amount and divide by the percentage of the alcohol given. The result equals the amount of stronger alcohol to be diluted. *Example.*—To make 100 C.c. of 30 per cent. alcohol from 94 per cent. alcohol: Multiply 30 by 100 and divide by 94; the result (31.9) equals the number of C.c. of the 94 per cent. alcohol to be diluted.

To convert all of a certain quantity to another percentage: Multiply the quantity of alcohol by its percentage strength and divide by the required percentage. The quotient gives the quantity *to which* the alcohol must be diluted. *Example.*—To dilute 500 C.c. of 94 per cent. alcohol to 87 per cent. Multiply 500 by 94 and divide by 87. The quotient 540 gives the number of C.c. to which the alcohol is to be diluted—*i. e.*, 40 C.c. of water are to be added.

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